

2014/15 Assessment of ASX Clearing and Settlement Facilities

September 2015

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1. Introduction and Executive Summary

In accordance with its responsibilities under the *Corporations Act 2001*, the Reserve Bank (the Bank) carries out periodic assessments of how well each clearing and settlement (CS) facility licensee is complying with applicable Financial Stability Standards (FSS) determined by the Bank and the more general obligation to do all other things necessary to reduce systemic risk.¹ The Bank is obliged under the Corporations Act to report its findings to the relevant Minister and the Australian Securities and Investments Commission (ASIC). Consistent with established policy, Assessment reports are also published on the Bank's website.

This report presents the Bank's Assessment of the four licensed CS facilities in the ASX Group (ASX) – the two central counterparties (CCPs), ASX Clear Pty Limited (ASX Clear) and ASX Clear (Futures) Pty Limited (ASX Clear (Futures)); and the two securities settlement facilities (SSFs), ASX Settlement Pty Limited (ASX Settlement) and Austraclear Limited (Austraclear) – for the year ending 30 June 2015.² In accordance with the governance arrangements for the Bank's oversight and supervision activities, this report has been reviewed and approved by the Payments System Board.

All four facilities have made substantial progress towards addressing the recommendations and regulatory priorities identified in the Bank's 2014/15 Assessment. Many of these priorities have been fully addressed.³ Accordingly, it is the Bank's assessment that all four facilities have either observed or broadly observed all relevant requirements under the FSS in the Assessment period (Section 2 and Appendix A). The Bank therefore concludes that the facilities have conducted their affairs in a way that causes or promotes overall stability in the Australian financial system.

The Bank has nevertheless made a number of recommendations to further strengthen the ASX facilities' observance of requirements under the FSS. Some recommendations have also been made to encourage continuous improvement, even where relevant requirements have been observed. Such improvement contributes to the ASX CS facilities' ongoing compliance with the obligation to do all other things necessary to reduce systemic risk.

The FSS are aligned with the requirements in the *Principles for Financial Market Infrastructures* (the PFMIs), developed by the Committee on Payments and Market Infrastructures (CPMI) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) that

1 Until June 2013, the Bank was obliged under the Corporations Act to carry out assessments annually. Further to a legislative amendment at that time, a CS facility licensee must be assessed annually only where this has been prescribed by regulation. While no CS facility licensee has yet been prescribed for annual assessment, the Bank has clarified in a policy statement that it intends to continue to carry out assessments of the ASX CS facility licensees on an annual basis; see <<http://www.rba.gov.au/payments-system/policy-framework/frequency-of-assessments.html>>.

2 In this report, the terms CS facility and CS facility licensee are used interchangeably.

3 The Bank's 2013/14 Assessment may be found at <<http://www.rba.gov.au/payments-system/clearing-settlement/assessments/2013-2014/index.html>>.

address matters relevant to financial stability.⁴ The Bank's Assessment applies the rating system used in the assessment methodology that supports the PFMI's.⁵

The Bank's Assessment also forms the basis for formal assessments of the ASX CS facilities against the principles within the PFMI's (the Principles), carried out jointly with ASIC. The Bank and ASIC have committed to carrying out these assessments periodically, with the first published in September 2014.⁶

1.1 Overview of Activity in the ASX Clearing and Settlement Facilities

In 2014/15, average price volatility in the markets cleared and settled by the ASX CS facilities was generally below the 10-year average (which includes spikes in volatility associated with the global financial crisis). Daily average values and volumes of cash equity trades cleared by ASX Clear increased during the year, by 10 per cent and 4 per cent, respectively, as did the volume of trading in the main futures contracts cleared by ASX Clear (Futures). The notional value of over-the-counter (OTC) interest rate derivatives (IRD) cleared by ASX Clear (Futures) also grew significantly. By contrast, the average daily number of equity options traded on the ASX market continued to decline, by a further 4 per cent. The daily average value of debt securities settled in Austraclear also declined compared with the previous year.

As measured by margin requirements, the ASX CCPs' total credit exposure was little changed in 2014/15, compared with the previous year. In line with the increase in trading activity, average daily initial margin held by ASX Clear against unsettled cash equity transactions increased by 27 per cent to \$165 million, while average daily margin held against equity derivatives was 3 per cent higher; lower open interest was offset by an increase in volatility. On ASX Clear (Futures), average daily initial margin rose by 2 per cent, driven largely by increases in the margin rate for the SPI 200 contract, as well as an increase in participants' open positions.

Key operational targets were met in the Assessment period. All key systems recorded 100 per cent availability, while peak usage was below the target of 50 per cent of all systems, ensuring adequate capacity headroom. ASX's ongoing project to insource future development of Austraclear's EXIGO system from NASDAQ OMX was progressed further during the period and is now scheduled for completion in October 2015.

1.2 Review of Regulatory Priorities and Key Recommendations

The principal focus of the 2014/15 Assessment is the ASX CS facilities' progress towards meeting the recommendations and regulatory priorities identified in the Bank's 2013/14 Assessment. These include recommendations related to CCP model validation – and, in particular, the validation of the CCPs' stress testing models – and recovery planning across all four CS facilities. These matters were the subject of 'deep dive' reviews during the Assessment period, summarised in Sections 5 and 6 of

4 As of 1 September 2014, the mandate and charter of the Committee on Payment and Settlement Systems (CPSS) have been refreshed and the Committee has been renamed. It is now known as the Committee on Payments and Market Infrastructures (CPMI).

5 See <<http://www.bis.org/cpmi/publ/d106.htm>> for the Principles and related *Disclosure framework and assessment methodology*.

6 The first Assessment against the Principles is available at <<http://www.rba.gov.au/payments-system/policy-framework/principles-fmi/assessments-of-cs-facilities.html>>.

the Assessment report. ASX has made considerable progress in all of the areas identified and has addressed many of the stated priorities.

Some of the key actions taken by ASX are summarised below, along with related core recommendations and priorities for the 2015/16 Assessment period.

Model validation and stress testing

Recommendations on model review and validation for the CCPs were mostly addressed during the Assessment period. The first phase of refinements and enhancements to ASX's capital stress-testing approach arising from the external validation carried out by PricewaterhouseCoopers (PwC) in 2014 were implemented in late July. These included an expansion of the risk factors covered by stress testing, changes to key model parameters (such as the assumed holding period, coverage targets and correlation assumptions) and the addition of new forward-looking stress scenarios.

The Assessment recommends that ASX carry out a planned second phase of enhancements to the CCPs' stress-testing framework and encourages ASX to follow up findings of the PwC validations of its margin models. The recommendations also encourage ASX to continue to review its stress-testing and margin models in light of evolving international best practice, including outcomes of CPMI-IOSCO work on margining and stress testing.

Recovery planning

The Bank's 2013/14 Assessment recommended that ASX Clear, ASX Clear (Futures), ASX Settlement and Austraclear take steps to enhance their recovery plans. In the case of the ASX CCPs, ASX Clear and ASX Clear (Futures), the recommended steps included the implementation of arrangements to fully address any uncovered credit losses and replenish financial resources following a participant default, as well as arrangements to fully meet any liquidity shortfall. The Bank's recommendations were mostly addressed during the Assessment period. New, more detailed and comprehensive, recovery arrangements were developed, including loss and liquidity allocation tools for the two ASX CCPs, and measures to address non-default losses across all four CS facilities. These are due to come into effect in October.

It is nevertheless recommended that ASX carry out further work to enhance arrangements for the replenishment of the CCP's financial resources in the event that these were drawn down following a participant default. The objective is to establish arrangements that would allow a more timely return to full financial cover while minimising the potential for transmission of liquidity stress to participants. The Bank also encourages ASX to complete documentation of its enhanced recovery plans and to review the plans on an ongoing basis.

Treasury investment policy

The Bank's 2013/14 Assessment recommended that ASX implement plans to further reduce the concentration of unsecured exposures to the large domestic banks under its treasury investment policy, noting that the Bank had opened a dialogue with ASX on the detail of its expectations for the credit and liquidity risk profile of the CCPs' investment portfolio.

During 2014/15, ASX further reduced the concentration of unsecured exposures to the large domestic banks and the Bank continued its dialogue with ASX on changes to its treasury investment policy. This dialogue clarified the Bank's expectation that ASX should:

- limit its unsecured credit exposures to individual non-government investment counterparties/issuers to the level of capital set aside for non-default or general business risk losses
- ensure that other investments are with government-related obligors or secured by assets issued by government-related or other highly creditworthy obligors, subject to prudent concentration limits
- ensure that the CCPs' minimum liquid resource requirement is invested in or secured by government/semi-government securities or cash, with other investments in, or secured by, securities eligible for repo with the Bank.

ASX's CS Boards have now endorsed further staged revisions to the CCPs' treasury investment policy, designed to meet the Bank's expectations. The Assessment recommends that ASX implement these plans by end 2016/17.

Cyber resilience

The Bank noted in its 2013/14 Assessment the increasing focus, both internationally and domestically, on the cyber resilience practices of financial market infrastructures (FMIs) and other key participants in the financial system. Given the highly disruptive impact that could result from an interruption to critical clearing and settlement services or a degradation of data integrity at an FMI, the Bank has continued a dialogue on cyber resilience matters during the 2014/15 Assessment period, in collaboration with ASIC. As part of this, the Bank requested that ASX carry out a self-assessment against the United States National Institute of Standards and Technology (NIST) Cybersecurity Framework, which is used widely by critical infrastructure providers and other organisations in a number of jurisdictions internationally. This high-level self-assessment concluded that ASX's cyber security practices generally aligned with the upper tier of maturity levels described under the framework.

ASX is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements, including on the Board-level governance of its cyber risks and ongoing review of its information security strategy and policy framework. ASX is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.

1.3 Other Material Developments

In addition to changes to policies and processes in response to recommendations and priorities arising from the Bank's 2013/14 Assessment, there were a number of additional material developments during the period. Perhaps the most prominent of these was ASX Clear's management, in May, of the default of the broker, BBY Limited (BBY; discussed in Section 4).

The default of BBY Limited (BBY)

On 18 May 2015, ASX was advised that a broker participant of ASX Clear, BBY, had entered into voluntary administration, triggering ASX Clear's default management processes. This followed two weeks of action by ASX to manage down BBY's clearing business after BBY had missed a deadline for a capital-based position limit (CBPL) related additional initial margin (AIM) call. ASX managed BBY's default through a combination of client transfers and the close out or expiry of remaining positions. Overall, the close out proceeded without any evident market impact and all losses arising in the close-

out process were sufficiently covered by margin held. The default management process nevertheless highlighted several matters relevant to ASX's risk management and default management arrangements that are worthy of further consideration.

ASX is encouraged to review its default management arrangements and consider broader experiences gained from the default of BBY.

Technology transformation

ASX launched a group-wide technology transformation project during the Assessment period. With this project, ASX aims to rationalise its core technology onto a single services platform, also taking the opportunity to replace existing proprietary standards and protocols with global standards. The Bank views the replacement of the CHES clearing and settlement system as an important element of this project. Another key outcome from the Bank's perspective will be the delivery of a new 'real-time' risk management system, which will have the capacity to calculate participants' margin requirements and stressed exposures in close to real time. ASX has indicated that, as it progressively develops these capabilities over the next two to three years, it will consider how to integrate more frequent margin and stress-test calculations into a 'real-time risk management' approach that will remove the potential for delay in covering intraday changes to exposures. The Bank is examining prioritisation decisions, resourcing challenges, interdependencies with day-to-day business-as-usual processes, and potential change-management issues associated with ASX's technology transformation project. This includes ensuring that investment in the replacement of CHES is appropriately prioritised.

Cross-border recognition

Both ASX Clear and ASX Clear (Futures) obtained recognition in the EU in late April. Ahead of this, the scope of the Bank's supplementary interpretation of the FSS, which had been issued for ASX Clear (Futures) in 2013, was extended to include ASX Clear. In accordance with this, ASX Clear transitioned at the end of March to covering credit and liquidity exposures on the default of its two largest participants plus affiliates (Cover 2). ASX Clear's pre-funded financial resources were already sufficient to meet the new requirement from a credit perspective, but the CCP had to source an additional \$100 million liquidity facility to meet the Cover 2 requirement for liquidity exposures. ASX Clear also established a participant risk consultative committee, which held its first meeting in March.

Separately, on 18 August 2015 ASX Clear (Futures) was granted an exemption from registration as a Derivatives Clearing Organization by the US Commodity Futures Trading Commission (CFTC). The exemption allows ASX Clear (Futures) to continue to provide OTC IRD clearing services to US entities, after previously relying on time-limited no-action relief from the CFTC.

The remainder of this report is structured as follows. Section 2 summarises in tabular form each CS facility's progress towards meeting recommendations and regulatory priorities arising from the Bank's 2013/14 Assessment, as well as conclusions and recommendations arising from the 2014/15 Assessment. Section 3 draws out material developments during the Assessment period and discusses the considerations underlying each recommendation. Section 4 summarises ASX's management of the default of BBY in May 2015; in light of the experience, some areas are highlighted that may merit further consideration in the coming period. Section 5 presents a 'special topic' on the ASX CCPs' stress-testing framework, which was enhanced during the period following an external validation of the stress-testing model. Section 6 presents a second 'special topic' on recovery planning, which,

further to the Bank's recommendations in the 2013/14 Assessment period, was also significantly enhanced. Appendix A concludes with the Bank's supplementary interpretation of the FSS for CCPs, an overview of the corporate structure of the ASX Group and the detailed assessments against the FSS for each CS facility.

The Bank welcomes ASX's continued efforts towards ensuring its CS facilities contribute to the stability of the Australian financial system. The Bank appreciates both the cooperation of ASX staff and management during the preparation of this Assessment, and the open and constructive dialogue throughout the Assessment period.

2. Summary and Review of Regulatory Priorities

This Section summarises actions taken by the ASX CS facilities over 2014/15 in relation to regulatory priorities identified in the 2013/14 Assessment, and summarises the recommendations and other priorities identified by the Bank in its 2014/15 Assessment of the facilities against the FSS.

2.1 Progress against 2013/14 Recommendations and other Priorities

The Bank's 2013/14 Assessment of ASX Clearing and Settlement Facilities set out a number of recommendations for the ASX CS facilities to address areas of concern identified under various standards or to support continuous improvement. The 2013/14 Assessment also noted several developments that the Bank would continue to monitor and other matters arising from the Assessment that the Bank wished to further discuss with ASX. Together these matters formed the Bank's regulatory priorities for the 2014/15 Assessment period.

The following table summarises the recommendations made to ASX in the 2013/14 Assessment, and actions taken by the ASX CS facilities in relation to these recommendations over the 2014/15 Assessment period.

Table 1: Summary of Progress against 2013/14 Recommendations and other Priorities

Recommendation/Priority	Standard	Facility	Actions
<i>Recommendations to address areas of concern</i>			
Recovery planning, loss and liquidity allocation. Implement plans to enhance the facilities' recovery plans consistent with international guidance, including mechanisms to fully address any uncovered credit losses and liquidity shortfalls, and replenish financial resources, following a participant default. Ensure that capital held continues to be sufficient to fund the enhanced plans. Review and integrate recapitalisation processes with broader recovery planning arrangements.	CCP Standards 3.5, 4.8, 7.9, 14.3 and 14.5, SSF Standards 3.5, 12.3 and 12.5	All facilities	Mostly addressed. Expected to be fully addressed in 2015/16 with enhancements to replenishment arrangements. ASX has developed a set of enhanced recovery arrangements, including loss and liquidity allocation arrangements for its CCPs, due to come into effect in October 2015. These developments are discussed in detail in Section 6.
Model review and validation. Complete the first year of the external independent model validation program. Continue to refine and enhance model validation methodologies.	CCP Standards 4, 6 and 7	Both CCPs	Fully addressed. External validations of capital stress-test, liquidity stress-test, and SPAN and OTC IRD margin models complete. External validation of cash market margining (CMM) model to be completed in 2015/16. Refinement and enhancement of model validation methodologies is ongoing, with margin backtesting and reverse stress testing integrated into daily and monthly risk management processes (see Section 3.5.1).

Recommendation/Priority	Standard	Facility	Actions
Liquidity stress testing. Enhance sensitivity analysis to allow systematic examination of underlying assumptions, including the degree to which timely settlement can be achieved without the use of offsetting transaction arrangements (OTAs).	CCP Standard 7	ASX Clear	Fully addressed. External review of liquidity stress-test model complete. ASX Clear has developed analytical tools to perform sensitivity analysis and reverse stress testing on its liquidity stress-testing model (see Section 3.5.1).
Investment risk. Implement plans to further reduce the concentration of unsecured exposures to the large domestic banks under the ASX Clearing Corporation (ASXCC) treasury investment policy, in line with the Bank's expectations for the credit and liquidity risk profile of the treasury investment portfolio.	CCP Standard 15	Both CCPs	Partly addressed. Expected to be fully addressed by end 2016/17. ASX has further reduced the concentration of unsecured exposures to the large domestic banks, and committed to transition to an investment policy that meets the Bank's expectations by end 2016/17 (see Section 3.5.4).
Account structure. ASX Clear to complete implementation of enhanced client protections for cash equities. ASX Clear (Futures) to implement client segregation arrangements that support the lodgement of excess client collateral.	CCP Standard 13	Both CCPs	Fully addressed. ASX Clear completed implementation of enhanced client protections for cash equities in May 2015. ASX Clear (Futures) has developed arrangements to support the segregation of excess client collateral, which will be introduced in September 2015 (see Section 3.5.3).
Resolution planning. Review operational arrangements in light of the proposed establishment of a special resolution regime for FMI in Australia, to ensure that they are consistent with the form of the regime once finalised.	CCP Standard 16.11, SSF Standard 14.11	All facilities	Not addressed. Progress dependent on legislation to establish an Australian FMI resolution regime, which is not yet in place (see Section 3.5.1).
Recommendations to support continuous improvement			
Framework for engagement with Payment Providers. Introduce a framework for formal engagement with Payment Providers on changes to settlement processes in response to regulatory or market-driven change.	CCP Standard 9, SSF Standard 8	ASX Clear, ASX Settlement	Fully addressed. ASX has engaged with APCA to establish a standing committee to address Payment Provider issues (see Section 3.5.6).
Other regulatory priorities – matters for further consideration by the Bank			
User governance. Monitoring the effectiveness of user governance arrangements.	CCP Standard 2, SSF Standard 2	All facilities	ASX has introduced a participant risk committee for ASX Clear in light of the Bank's supplementary interpretation of CCP Standard 2. The Bank has continued engagement with ASX on its broader user governance arrangements (see Sections 3.5.2 and 3.6).
Risk management policies and standards. Continue monitoring the maintenance of existing risk management policies and standards, and the finalisation of new policies and standards.	CCP Standard 3, SSF Standard 3	All facilities	The Bank has received updates to policies and standards as these have been reviewed or finalised (see Section 3.5.2).

Recommendation/Priority	Standard	Facility	Actions
Model validation. Monitoring developments in ASX's model validation framework, including the outcome of external model validations, ongoing review of stress-testing scenarios and collateral haircut rates, and ongoing implementation of backtesting and sensitivity analysis.	CCP Standards 4, 5, 6 and 7	Both CCPs	The Bank has continued to monitor and discuss with ASX developments in its model validation framework, and receives margin backtesting and reverse stress-testing results on a monthly basis (see Section 3.5.1).
Real-time novation. Monitoring the effectiveness of the risk management of real-time novation arrangements for OTC IRD transactions.	CCP Standard 4	ASX Clear (Futures)	The Bank has received an update on the effectiveness of real-time novation arrangements for OTC IRD (see Appendix A1.2, CCP Standard 4.2).
Collateral concentration. Continuing discussion on ASX's approach to monitoring collateral concentration risks.	CCP Standard 5	Both CCPs	The Bank has further discussed collateral concentration issues with ASX (see Appendices A1.1 and A1.2, CCP Standard 5.5).
Procyclicality. Continuing discussion with ASX on the measurement and management of procyclicality in margin models.	CCP Standard 6	Both CCPs	ASX has revised its policy on procyclicality and discussed this with the Bank in November 2014 (see Section 3.5.1).
Participant liquidity risk. Monitoring planned enhancements to liquidity stress testing at ASX Clear to reflect the use of OTAs, and discussing disclosure to participants on the potential liquidity impacts, both from the use of OTAs and from addressing failed transactions in the settlement batch more broadly.	CCP Standard 7, SSF Standard 6	ASX Clear, ASX Settlement	ASX Clear has developed analytical tools to supplement its liquidity stress testing, enabling a clearer separation of equities- and derivatives-related liquidity obligations. ASX has commenced work to provide additional disclosure of potential liquidity impacts from OTAs or failed settlements to participants (see Section 3.5.1).
Foreign Currency Settlement Service. Monitoring developments and continuing to consider the appropriateness of settlement arrangements for the level of activity.	SSF Standard 8	Austraclear	The Bank has received regular updates on activity in the RMB settlement service, and considers the current settlement arrangements remain appropriate for the level of activity. The Bank will continue to monitor use of this service as part of its ongoing oversight activities (see Section 3.5.5).
Commingled pooled resources. Continuing to monitor the annual review of commingled arrangements and the adequacy of pooled resources.	CCP Standard 4	ASX Clear (Futures)	ASX has concluded that the commingled arrangements for, and sizing of, pooled financial resources in ASX Clear (Futures) remain appropriate (see Section 3.5.1).
Default management. Continuing to monitor the review of default management procedures for OTC IRD.	CCP Standard 12	ASX Clear (Futures)	The Bank has continued to monitor the activities of the OTC participant Default Management Group (DMG) and internal ASX review of OTC default procedures, including by attendance at the OTC default management fire drill in July 2015 (see Section 3.5.3).
Cyber security. Continuing to discuss with ASX its approach to cyber security.	CCP Standard 16, SSF Standard 14	All facilities	The Bank, together with ASIC, has continued to discuss with ASX its cyber resilience approach (see Section 3.5.6).
Concentration in tiering. Monitoring the operation of ASX's approach to managing concentration risks in tiered participation.	CCP Standard 18	Both CCPs	The Bank has received regular updates via ASX risk-management meetings and reports (see Appendices A1.1 and A1.2, CCP Standard 18).
Disclosure. Continuing to monitor steps to refine and enhance disclosure.	CCP Standard 21, SSF Standard 19	All facilities	ASX has released an expanded Disclosure Framework in new format, to be updated annually or as needed (see Section 3.5.8).

2.2 2014/15 Ratings and Recommendations

The following tables summarise the Reserve Bank's 2014/15 Assessment of ASX's CS facilities against the FSS. In setting out its Assessment, the Bank has applied the rating system used in the *Principles for Financial Market Infrastructures: Disclosure framework and assessment methodology* produced by CPMI and IOSCO in December 2012.⁷ Under this rating system a facility's observance of a standard may be rated as:

Observed – Any identified gaps and shortcomings are not issues of concern and are minor, manageable and of a nature that the facility could consider taking them up in the normal course of its business.

Broadly observed – The assessment has identified one or more issues of concern that the facility should address and follow up on in a defined timeline.

Partly observed – The assessment has identified one or more issues of concern that could become serious if not addressed promptly. The facility should accord a high priority to addressing these issues.

Not observed – The assessment has identified one or more serious issues of concern that warrant immediate action. Therefore, the facility should accord the highest priority to addressing these issues.

Not applicable – The standard does not apply to the type of facility being assessed because of the particular legal, institutional, structural or other characteristics of the facility.

Section 821A(aa) of the Corporations Act requires that a CS facility licensee, to the extent reasonably practicable to do so, comply with the FSS and do all other things necessary to reduce systemic risk. The Bank has assessed how well each CS facility has complied with each CCP or SSF Standard, and applied a single overall rating to each standard, reflecting this assessment.

Where a facility has been assessed to *observe* a CCP or SSF Standard, the Bank nevertheless expects ASX to work towards continual strengthening of its observance of the standard. ASX recognises this and has governance arrangements in place to motivate and encourage continuous improvement. The tables include recommendations encouraging such improvement in some specific areas. These are not exhaustive, and ASX is encouraged to continue to seek further improvements to its observance of the FSS over the coming Assessment period. This is in accordance with the general obligation on CS facilities to do all things necessary to reduce systemic risk.

Where a facility has been assessed to *broadly observe* a CCP or SSF Standard, the Bank will have sought evidence that a plan is in place to address the identified issue of concern within a clear, defined and reasonable time frame, and that it would not be reasonably practicable for the facility to take such actions immediately in order to fully observe the standard. The tables include recommendations that identify the steps required by ASX to address the relevant issues of concern and fully observe the applicable CCP or SSF Standard.

In addition, Table 6 lists other matters identified in the course of conducting the Assessment that the Bank will continue to monitor or discuss with ASX. These include areas in which ongoing review is required to ensure that emerging new risks are adequately controlled.

The recommendations and other matters in Tables 2 to 6 will form the basis for the Bank's regulatory priorities in 2015/16, and are discussed in more detail in Section 3 and in Appendix A.

⁷ Available at <<http://www.bis.org/cpmi/publ/d106.htm>>.

Table 2: ASX Clear Ratings and Recommendations

Standard	Rating	Recommendation
1. Legal basis	Observed	
2. Governance	Observed	
3. Framework for the comprehensive management of risks	Observed	<p>ASX Clear is encouraged to complete planned updates to the documentation of its recovery plans to take into account its expanded suite of recovery tools.</p> <p>ASX Clear is encouraged to integrate testing and review of its recovery plan into its broader framework for testing and review of risk management and default management policies and processes. The Bank will monitor the outcomes from this testing and review process.</p>
4. Credit risk	Broadly observed	<p>In order to fully observe CCP Standard 4, ASX Clear should complement its comprehensive loss allocation arrangements by further refining its replenishment arrangements to ensure that it is able to return to the full level of cover required under CCP Standard 4.4 on a more timely basis, while minimising the potential for procyclicality. ASX is also encouraged to test and review its capacity to replenish its own contribution to the ASX Clear default fund.</p> <p>ASX Clear is encouraged periodically to review its loss allocation arrangements, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.</p> <p>ASX Clear is encouraged to carry out plans to develop additional disclosures to assist participants in understanding their contingent exposure to the use of loss allocation tools.</p> <p>ASX Clear is encouraged to continue to review its interpretation of 'extreme but plausible' market conditions in light of evolving international best practice, including outcomes of CPMI-IOSCO work on stress testing.</p> <p>ASX Clear is encouraged to implement the planned second phase of enhancements to its stress-testing models, including to:</p> <ul style="list-style-type: none"> • make active 'forward-looking' hypothetical scenarios that represent macroeconomic or market-wide events, currently used for information only • incorporate further scenarios based on peak historic price volatilities within the Board-approved historical look-back period, and additional scenarios for information only based on peak historic price volatilities beyond this period • introduce a framework for collectively shocking individual sectors in ASX Clear that takes into account the potential for coincident broader market-wide shocks • introduce additional forward-looking scenarios for information only that address the potential impact of market disruptions, multiple defaults and any dependencies on defaulting participants that might affect the default management process • introduce additional scenarios for information only that address situations that may be regarded as beyond 'extreme but plausible'. <p>The Bank will continue to monitor ASX Clear's use, review and validation of its capital stress-testing model (see Section 5, Table 13).</p>
5. Collateral	Observed	
6. Margin	Observed	<p>ASX Clear is encouraged to review its margining approach in light of the external validation of its margin models, experience gained from the BBY default and evolving international best practice, including outcomes of CPMI-IOSCO work on margining. The review should examine key parameter assumptions, including the holding and look-back periods, and mitigants against shortfalls in relation to individual client accounts.</p>

Standard	Rating	Recommendation
7. Liquidity risk	Observed	<p>ASX Clear is encouraged to continue to refine and enhance the sensitivity analysis of its liquidity stress-testing model and its reverse stress-testing framework for liquidity, and to continue to integrate these into its broader stress-testing and liquidity management processes. This includes examining further the sensitivity of outcomes to certain underlying assumptions. One matter in particular that ASX Clear is encouraged to consider further is how it models the degree of reliance on offsetting transaction arrangements in its liquidity risk management framework. ASX Clear is also encouraged to continue to review its approach to liquidity stress testing in light of the external validation of its liquidity stress-testing model and evolving international best practice, including outcomes of CPMI-IOSCO work on liquidity stress testing.</p> <p>ASX Clear is encouraged periodically to review its arrangements to address a liquidity shortfall, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.</p> <p>ASX Clear is encouraged to carry out plans to develop additional disclosures to assist participants in understanding their contingent exposure to the use of tools to address a liquidity shortfall.</p>
8. Settlement finality	Observed	
9. Money settlements	Observed	
10. Physical deliveries	Not applicable	
11. Exchange-of-value settlements	Observed	
12. Participant default rules and procedures	Observed	ASX Clear is encouraged to complete its review of experiences gained from the BBY default, and to update its default management arrangements and risk management approach as appropriate.
13. Segregation and portability	Broadly observed	<p>In order to fully observe CCP Standard 13, ASX Clear should complete the implementation of planned enhancements to client segregation arrangements that support the lodgement of excess client cash collateral in respect of derivatives positions.</p> <p>ASX Clear is also encouraged to consider any implications for portability arrangements arising from management of the default of BBY.</p>
14. General business risk	Observed	<p>ASX Clear is encouraged to:</p> <ul style="list-style-type: none"> periodically review its arrangements to allocate investment-related losses, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact test and review its capacity to raise additional equity to replenish general business risk capital.
15. Custody and investment risks	Broadly observed	<p>In order to fully observe CCP Standard 15, ASX Clear should, by end 2016/17, implement plans to:</p> <ul style="list-style-type: none"> limit unsecured exposures to individual non-government investment counterparties/issuers to the level of capital set aside for non-participant-default or general business risk losses ensure that other investments are with government-related obligors or secured by assets issued by government-related or other highly creditworthy obligors, subject to prudent concentration limits ensure that ASX Clear's minimum liquid resource requirement (under CCP Standard 7.3) is invested in or secured by government/semi-government securities or cash. Other investments should be able to address effectively any uncovered liquidity shortfalls (e.g. be investments in, or secured by, securities eligible for repo with the Bank).

Standard	Rating	Recommendation
16. Operational risk	Observed	<p>In order to continue to observe CCP Standard 16, ASX Clear will need to review its operational arrangements in light of the proposed establishment of a special resolution regime for FMIs in Australia. In particular, ASX Clear will need to ensure that its operations are organised in such a way as to facilitate effective crisis management actions under that regime once finalised.</p> <p>ASX Clear is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements, including on the Board-level governance of its cyber risks and ongoing review of its information security strategy and policy framework. ASX Clear is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.</p>
17. Access and participation requirements	Observed	
18. Tiered participation arrangements	Observed	
19. FMI links	Observed	
20. Disclosure of rules, key policies and procedures, and market data	Observed	In order to continue to observe CCP Standard 20, ASX Clear should carry out plans to regularly publish risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs.
21. Regulatory reporting	Observed	

Table 3: ASX Clear (Futures) Ratings and Recommendations

Standard	Rating	Recommendations
1. Legal basis	Observed	
2. Governance	Observed	
3. Framework for the comprehensive management of risks	Observed	<p>ASX Clear (Futures) is encouraged to complete planned updates to the documentation of its recovery plans to take into account its expanded suite of recovery tools.</p> <p>ASX Clear (Futures) is encouraged to integrate testing and review of its recovery plan into its broader framework for testing and review of risk management and default management policies and processes. The Bank will monitor the outcomes from this testing and review process.</p>
4. Credit risk	Broadly observed	<p>In order to fully observe CCP Standard 4, ASX Clear (Futures) should complement its comprehensive loss allocation arrangements by further refining its replenishment arrangements to ensure that it is able to return to the full level of cover required under CCP Standard 4.4 on a more timely basis, while minimising the potential for procyclicality. ASX is also encouraged to test and review its capacity to replenish its own contribution to the ASX Clear (Futures) default fund.</p> <p>ASX Clear (Futures) is encouraged periodically to review its loss allocation arrangements, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.</p> <p>ASX Clear (Futures) is encouraged to carry out plans to develop additional disclosures to assist participants in understanding their contingent exposure to the use of loss allocation tools.</p> <p>ASX Clear (Futures) is encouraged to continue to review its interpretation of 'extreme but plausible' market conditions in light of evolving international best practice, including outcomes of CPMI-IOSCO work on stress testing.</p> <p>ASX Clear (Futures) is encouraged to implement the planned second phase of enhancements to its stress-testing models, including to:</p> <ul style="list-style-type: none"> incorporate further scenarios based on peak historic price volatilities within the Board-approved historical look-back period, and additional scenarios for information only based on peak historic price volatilities beyond this period introduce additional forward-looking scenarios for information only that address the potential impact of market disruptions, multiple defaults and any dependencies on defaulting participants that might affect the default management process perform additional sensitivity analysis on the assumed shape of the yield curve in stress-test scenarios introduce additional scenarios for information only that address situations that may be regarded as beyond 'extreme but plausible'. <p>ASX Clear (Futures) is encouraged to continue to monitor the impact of absolute versus relative changes in yields for applying shocks to interest rate contracts and ensure that appropriate absolute floors for yield shocks are implemented where appropriate.</p> <p>The Bank will continue to monitor ASX Clear (Futures)' use, review and validation of its capital stress-testing model (see Section 5, Table 13).</p>
5. Collateral	Observed	
6. Margin	Observed	<p>ASX Clear (Futures) is encouraged to review its margining approach in light of the external validation of its margin models and evolving international best practice, including outcomes of CPMI-IOSCO work on margining. The review should examine key parameter assumptions, including the holding and look-back periods.</p>

Standard	Rating	Recommendations
7. Liquidity risk	Observed	<p>ASX Clear (Futures) is encouraged to review its approach to liquidity stress testing in light of the external validation of its stress-testing models and evolving international best practice, including outcomes of CPMI-IOSCO work on stress testing.</p> <p>ASX Clear (Futures) is encouraged periodically to review its arrangements to address a liquidity shortfall, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.</p>
8. Settlement finality	Observed	
9. Money settlements	Observed	
10. Physical deliveries	Observed	
11. Exchange-of-value settlements	Observed	
12. Participant default rules and procedures	Observed	
13. Segregation and portability	Observed	
14. General business risk	Observed	<p>ASX Clear (Futures) is encouraged to:</p> <ul style="list-style-type: none"> periodically review its arrangements to allocate investment-related losses, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact test and review its capacity to raise additional equity to replenish general business risk capital.
15. Custody and investment risks	Broadly observed	<p>In order to fully observe CCP Standard 15, ASX Clear (Futures) should, by end 2016/17, implement plans to:</p> <ul style="list-style-type: none"> limit unsecured exposures to individual non-government investment counterparties/issuers to the level of capital set aside for non-participant-default or general business risk losses ensure that other investments are with government-related obligors or secured by assets issued by government-related or other highly creditworthy obligors, subject to prudent concentration limits ensure that ASX Clear (Futures)' minimum liquid resource requirement (under CCP Standard 7.3) is invested in or secured by government/semi-government securities or cash. Other investments should be able to address effectively any uncovered liquidity shortfalls (e.g. be investments in, or secured by, securities eligible for repo with the Bank).
16. Operational risk	Observed	<p>In order to continue to observe CCP Standard 16, ASX Clear (Futures) will need to review its operational arrangements in light of the proposed establishment of a special resolution regime for FMIs in Australia. In particular, ASX Clear (Futures) will need to ensure that its operations are organised in such a way as to facilitate effective crisis management actions under that regime once finalised.</p> <p>ASX Clear (Futures) is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements, including on the Board-level governance of its cyber risks and ongoing review of its information security strategy and policy framework. ASX Clear (Futures) is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.</p>
17. Access and participation requirements	Observed	
18. Tiered participation arrangements	Observed	
19. FMI links	Observed	

Standard	Rating	Recommendations
20. Disclosure of rules, key policies and procedures, and market data	Observed	In order to continue to observe CCP Standard 20, ASX Clear (Futures) should carry out plans to regularly publish risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs.
21. Regulatory reporting	Observed	

Table 4: ASX Settlement Ratings and Recommendations

Standard	Rating	Recommendations
1. Legal basis	Observed	
2. Governance	Observed	
3. Framework for the comprehensive management of risks	Observed	ASX Settlement is encouraged to complete planned updates to the documentation of its recovery plans.
4. Credit risk	Not applicable	
5. Collateral	Not applicable	
6. Liquidity risk	Observed	ASX Settlement is encouraged to consider supplementing planned disclosures by ASX Clear to assist clearing participants in understanding their contingent exposure to the use of tools to address a liquidity shortfall with additional information to settlement participants on the potential liquidity impact of reconstitution of the ASX Settlement batch from failed settlements. In doing so, ASX Settlement is encouraged to consider the liquidity impact of batch reconstitution in scenarios that include, but are not limited to, the management of an ASX Clear participant default.
7. Settlement finality	Observed	
8. Money settlements	Observed	
9. Central securities depositories	Observed	
10. Exchange-of-value settlement systems	Observed	
11. Participant default rules and procedures	Observed	
12. General business risk	Observed	ASX Settlement is encouraged to test and review its capacity to raise additional equity to replenish general business risk capital.
13. Custody and investment risks	Not applicable	
14. Operational risk	Observed	<p>In order to continue to observe SSF Standard 14, ASX Settlement will need to review its operational arrangements in light of the proposed establishment of a special resolution regime for FMIs in Australia. In particular, ASX Settlement will need to ensure that its operations are organised in such a way as to facilitate effective crisis management actions under that regime once finalised.</p> <p>ASX Settlement is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements, including on the Board-level governance of its cyber risks and ongoing review of its information security strategy and policy framework. ASX Settlement is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.</p>
15. Access and participation requirements	Observed	
16. Tiered participation arrangements	Observed	
17. FMI links	Observed	
18. Disclosure of rules, key policies and procedures, and market data	Observed	
19. Regulatory reporting	Observed	

Table 5: Austraclear Ratings and Recommendations

Standard	Rating	Recommendations
1. Legal basis	Observed	
2. Governance	Observed	
3. Framework for the comprehensive management of risks	Observed	Austraclear is encouraged to complete planned updates to the documentation of its recovery plans.
4. Credit risk	Not applicable	
5. Collateral	Not applicable	
6. Liquidity risk	Observed	
7. Settlement finality	Observed	
8. Money settlements	Observed	
9. Central securities depositories	Observed	
10. Exchange-of-value settlement systems	Observed	
11. Participant default rules and procedures	Observed	
12. General business risk	Observed	Austraclear is encouraged to test and review its capacity to raise additional equity to replenish general business risk capital.
13. Custody and investment risks	Observed	
14. Operational risk	Observed	<p>In order to continue to observe SSF Standard 14, Austraclear will need to review its operational arrangements in light of the proposed establishment of a special resolution regime for FMIs in Australia. In particular, Austraclear will need to ensure that its operations are organised in such a way as to facilitate effective crisis management actions under that regime once finalised.</p> <p>Austraclear is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements, including on the Board-level governance of its cyber risks and ongoing review of its information security strategy and policy framework. Austraclear is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.</p>
15. Access and participation requirements	Observed	
16. Tiered participation arrangements	Observed	
17. FMI links	Observed	
18. Disclosure of rules, key policies and procedures, and market data	Observed	
19. Regulatory reporting	Observed	

Table 6: Other Regulatory Priorities

Standard	Facilities	Priority
CCP Standard 2, SSF Standard 2	All facilities	The Bank will continue to monitor the effectiveness of user governance arrangements in each of the ASX CS facilities.
CCP Standard 5	Both CCPs	The Bank will continue to discuss with ASX its approach to monitoring collateral concentration risks.
CCP Standard 9, SSF Standard 8	ASX Clear, ASX Settlement	The Bank will monitor ASX's interaction with the recently established APCA standing sub-committee for Payment Providers, as a formal means of engagement on changes to settlement processes in response to regulatory or market-driven change.
CCP Standard 12	ASX Clear (Futures)	The Bank will continue to monitor the testing and review of OTC default management procedures by ASX Clear (Futures) and the Default Management Group for OTC interest rate derivatives.
CCP Standard 12	ASX Clear (Futures)	The Bank will continue to monitor ASX Clear (Futures)' annual review of its use of commingled pooled financial resources for OTC and exchange-traded derivatives, as well as the adequacy of those resources.
CCP Standard 15	Both CCPs	The Bank will discuss with ASX its approach to disclosing investment risks to participants in light of plans to introduce a power to allocate investment losses in excess of \$75 million to participants.
CCP Standard 16, SSF Standard 14	All facilities	The Bank will continue to monitor prioritisation decisions, resourcing challenges, interdependencies with day-to-day business-as-usual processes, and potential change-management issues associated with ASX's technology transformation project. This includes the prioritisation of investment in the replacement of CHES.
CCP Standard 16, SSF Standard 14	All facilities	The Bank will discuss with ASX how it applies the CPMI-IOSCO oversight expectations in managing its relationships with external providers of critical services, including the role of the recently released CPMI-IOSCO Assessment Methodology in its oversight of these critical service providers.
CCP Standard 18	Both CCPs	The Bank will continue to monitor the operation of ASX's risk-based approach to monitoring concentration risks in tiered participation, particularly as participants and their customers transition to the individually segregated client account structure in ASX Clear (Futures) and in light of any experience gained from the default of BBY Limited.

3. Assessment of Clearing and Settlement Facilities against the Financial Stability Standards

3.1 Introduction to the ASX Clearing and Settlement Facilities

The ASX Group operates four CS facilities: two CCPs and two SSFs. Each of these facilities holds a CS facility licence, and each is required under the *Corporations Act 2001* to comply with applicable FSS determined by the Reserve Bank and to do all other things necessary to reduce systemic risk.

3.1.1 Central counterparties

A CCP acts as the buyer to every seller, and the seller to every buyer in a market. It does so by 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 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 participant defaults on its obligations to the CCP, since the CCP must continue to meet its obligations to all of the non-defaulting participants. Accordingly, it is critical that the CCP identifies and properly controls risks arising from its operations and conducts its affairs in accordance with the CCP Standards. Primary responsibility for the design and operation of a CCP in accordance with the CCP Standards lies with a CS facility licensee's board and senior management.

The ASX Group includes two CCPs that are required to observe the CCP Standards:

- ASX Clear Pty Limited (ASX Clear) provides CCP services for ASX-quoted cash equities, debt products and warrants traded on the ASX and Chi-X Australia Pty Ltd (Chi-X) markets, and equity-related derivatives traded on the ASX market.
- ASX Clear (Futures) Pty Limited (ASX Clear (Futures)) provides CCP services for futures and options on interest rate, equity, energy and commodity products traded on the ASX 24 market, as well as Australian dollar-denominated OTC IRD.

3.1.2 Securities settlement facilities

An SSF provides for the final settlement of securities transactions. Settlement involves transfer of the title to the security, as well as the transfer of cash. These functions are linked via appropriate delivery-versus-payment arrangements incorporated within the settlement process. Since SSFs are important FMIs that are critical to the smooth functioning of the financial system, it is critical that each SSF identifies and properly controls risks arising from its operations and conducts its affairs in accordance with the SSF Standards. Primary responsibility for the design and operation of an SSF in accordance with the SSF Standards lies with a CS facility licensee's board and senior management.

The ASX Group includes two SSFs that are required to observe the SSF Standards:

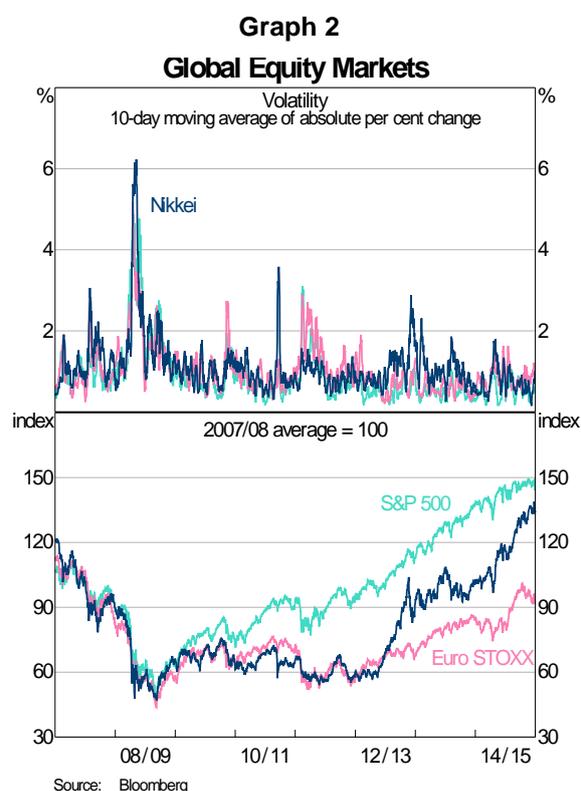
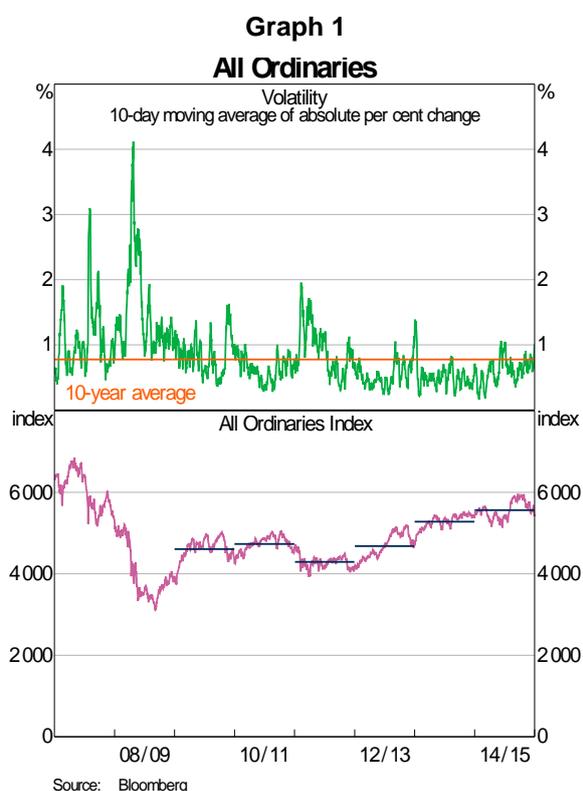
- ASX Settlement Pty Limited (ASX Settlement) provides SSF services for ASX-quoted cash equities, debt products and warrants traded on the ASX and Chi-X markets; ASX Settlement also provides SSF services for non-ASX listed securities quoted on the National Stock Exchange of Australia (NSX) and Asia Pacific Stock Exchange (APX).
- Austraclear Limited (Austraclear) provides SSF services for trades in debt securities, including government bonds and repurchase agreements.

3.2 Activity in the ASX Clearing and Settlement Facilities

In 2014/15, average price volatility in the markets cleared and settled by the ASX CS facilities was generally below the 10-year average (which includes spikes in volatility associated with the global financial crisis). There were increases in the volume of trading of cash equities cleared by ASX Clear and in the main futures contracts cleared by ASX Clear (Futures), and a significant increase in the notional value of OTC IRD cleared by ASX Clear (Futures). In contrast, the volume of trades in equity options continued to decline. The daily average value of debt securities settled in Austraclear also declined compared with the previous year.

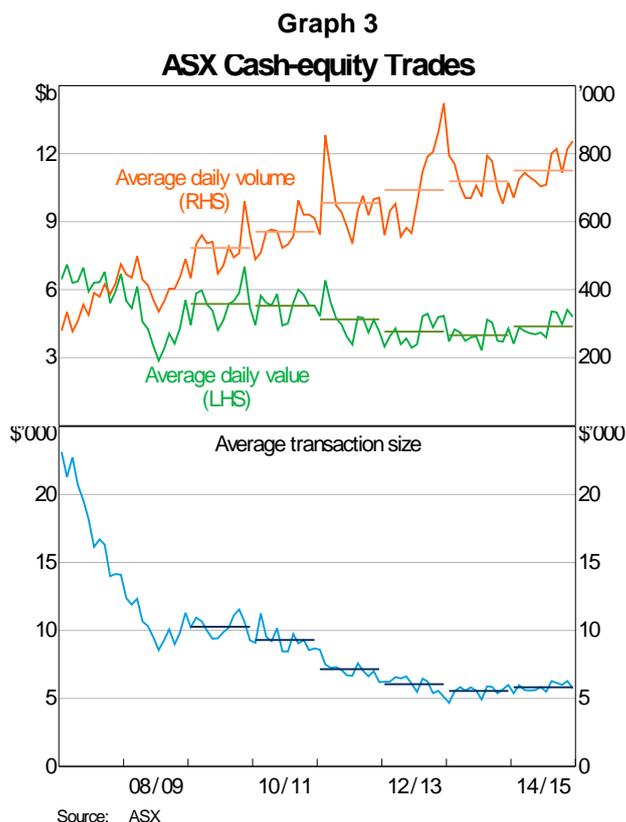
3.2.1 Cash equities

The average volatility in equity prices, as measured by the average of absolute daily percentage changes in the S&P ASX All Ordinaries Index, was 0.6 per cent in 2014/15 (Graph 1). Although volatility had picked up modestly from the previous year, it remained below the 10 year average for much of 2014/15. These developments are broadly in line with trends in major international equity markets (Graph 2).



The daily average value and volume of cash equity trades increased by 10 per cent and 4 per cent, respectively, in 2014/15 (Graph 3). Following a run of years in which the average transaction size has fallen (a trend associated with the growth in algorithmic trading), average transaction size rose by 5 per cent in 2014/15.

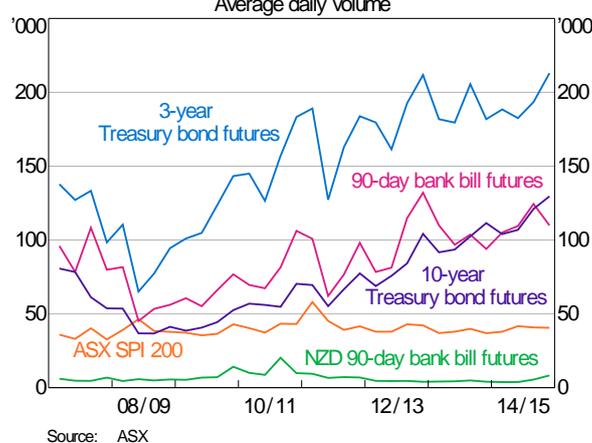
The daily average value of cash equity settlements in ASX Settlement increased by 3 per cent in 2014/15 to \$8.5 billion; trends in net settlement values can deviate from trends in gross trading values, since the latter do not include non-market transactions and netting efficiency can change over time.



3.2.2 Derivatives

The average daily trading volume on the ASX 24 market increased by 7 per cent in 2014/15, to around 490 000 trades per day (Graph 4). This was driven by increases in the average turnover of 10-year Treasury bond futures (up 16 per cent) and 90-day bank bill futures (up 11 per cent). Daily average volumes for SPI 200 equity index futures increased by around 6 per cent, while trading of 3-year Treasury bond futures increased by around 4 per cent compared with 2013/14. Traded volumes in the most actively traded NZD contract (90-day bank bill futures) increased by around 20 per cent compared with 2013/14. Overall positions in NZD futures, together with agricultural and energy contracts, remained small relative to positions in the four major contracts (see Section 5.4.1).

Graph 4
ASX 24 Derivatives Trades
Average daily volume



By contrast, the average daily number of equity options contracts traded on the ASX market continued to decline in 2014/15, by a further 4 per cent. In response to these declining volumes, ASX has continued to implement changes in the exchange-traded options (ETO) market, in consultation with an advisory panel comprising participants and end users. These changes are aimed at tailoring the scope of ASX's equity options to the market demand by consolidating inactive listings and providing more flexible alternatives, for example by broadening the range of ETO products and offering central clearing of OTC equity options.

3.2.3 Debt securities

In 2014/15 the average daily value of debt securities settled in Austraclear decreased by around 1 per cent, to \$40 billion. This includes the value of securities under repurchase agreements (other than intraday repurchase agreements with the Bank). There has been no material migration of settlement activity in Australian Government securities from Austraclear to ASX Settlement since the 2013 launch of a service aimed at retail investors to trade, clear and settle interest in Australian Government securities.

3.3 Risk Management in the ASX Central Counterparties

A CCP is exposed to potential losses arising in the event of participant default. ASX Clear and ASX Clear (Futures) manage this risk in a number of ways, including through participation requirements, margin collection, the maintenance of prefunded pooled risk resources, recovery tools, and risk monitoring and compliance activities.

3.3.1 Participation requirements

Participants in each CCP must meet minimum capital requirements. While capital is only a proxy for the overall financial standing of a participant, minimum capital requirements offer comfort that a participant has adequate resources to withstand an unexpected shock, perhaps arising from operational or risk-control failings.

- ASX Clear requires Direct Participants that clear cash equities or derivatives to maintain at least \$5 million in capital. In August 2014, ASX introduced tiered capital requirements for General Participants (which are able to clear on behalf of third-party participants), under which a General

Participant must maintain \$5 million in capital to support its own clearing activity and an additional \$5 million to support each third-party clearing relationship, up to \$20 million.⁸ See Section 3.5.7 for further discussion of participation requirements at ASX Clear.

- ASX Clear (Futures) requires participants to hold at least \$5 million in net tangible assets (NTA). Participants using the OTC derivatives clearing service must meet a higher minimum NTA (or Tier 1 Capital) requirement of \$50 million.

3.3.2 Margin collection

The CCPs cover their credit exposures to their participants by collecting several types of margin.

- *Variation margin.* Variation (or 'mark-to-market') margin is collected at least daily from participants with mark-to-market losses and, in the case of futures and OTC derivatives, paid out to the participants with mark-to-market gains.
- *Initial margin.* The CCPs are also exposed to credit risk arising from potential changes in the market value of a defaulting participant's open positions between the last settlement of variation margin and the close out of these positions by the CCP. To mitigate this risk, both CCPs routinely collect initial margin from participants.
- *Intraday margin.* Both CCPs monitor participants' portfolios intraday, to take account of changes in both prices and positions. Intraday calls may be made where there is significant erosion in the margin cover provided by individual participants for derivatives positions. Intraday margin calculations are carried out routinely in ASX Clear (Futures), but calls may also be made on an ad-hoc basis in both CCPs.
- *Additional initial margin.* The CCPs may also make calls for AIM when exceptionally large or concentrated exposures are identified through stress testing, or when predefined limits on the ratio of positions to capital are exceeded.

ASX requires that margin be posted in the form of cash or securities that ASX would be able to rapidly and reliably liquidate in the event of the participant's default. ASX applies haircuts to non-cash collateral to cover market risk on the liquidation of securities.⁹ Much of the margin posted across the two CCPs in 2014/15 took the form of cash; an average of 43 per cent of margin requirements in ASX Clear and 98 per cent of Australian dollar margin requirements in ASX Clear (Futures) were met in cash during the Assessment period. Clients of participants in ASX Clear commonly post collateral in excess of margin requirements for equity derivatives; in 2014/15, on average only 16 per cent of total non-cash collateral posted in ASX Clear was required to meet margin obligations.

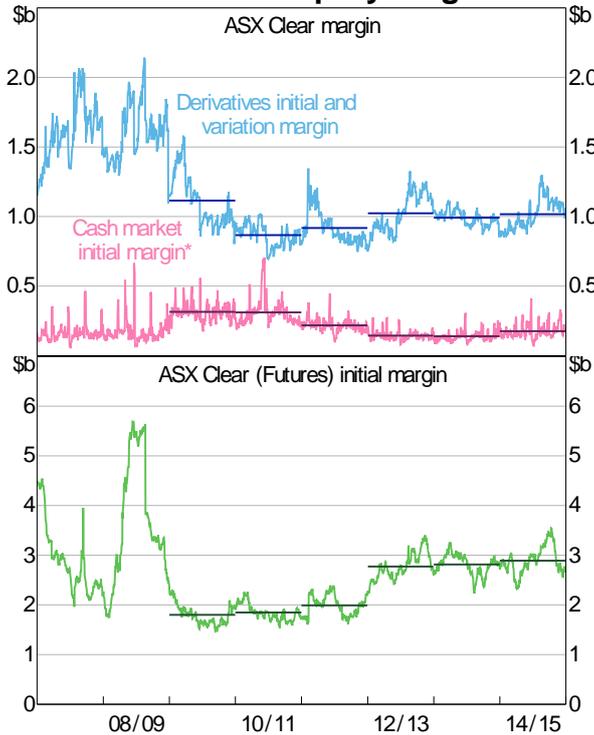
As measured by margin requirements, the CCPs' total credit exposure increased in 2014/15, compared with the previous year.

- Average daily margin held by ASX Clear against equity derivatives was 3 per cent higher in 2014/15, with lower open interest at least partly offset by an increase in volatility. In line with the increase in trading activity, average daily initial margin held by ASX Clear against unsettled cash equity transactions increased by 27 per cent during 2014/15 (Graph 5, top panel).

8 Previously, all General Participants were required to maintain at least \$20 million in capital. Under the new requirements, a General Participant that clears only on behalf of a third-party participant must maintain \$5 million in capital.

9 Haircuts are also applied to foreign currency collateral to cover exchange rate risk.

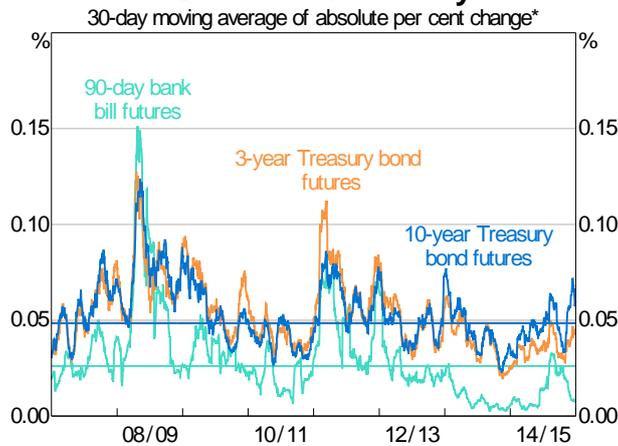
Graph 5
Central Counterparty Margins



* Notional amount until 7 June 2013; Real Risk methodology used until 18 July 2012, Cash Market Margining used thereafter
Source: ASX

- Average daily initial margin held by ASX Clear (Futures) rose by 3 per cent in 2014/15 (Graph 5, bottom panel). This is consistent with increases in the margin rate for the SPI 200 contract, associated with increased volatility in equity prices, as well as an increase in participants' open positions. Volatility in interest rate futures prices on the ASX 24 market also picked up slightly over 2014/15, albeit from a relatively low base (Graph 6).

Graph 6
ASX 24 Market Volatility



* Horizontal lines indicate the 10-year average for each series
Source: Bloomberg

The CCPs call margin on an intraday basis when exposures due to changes in market value and the opening of new positions exceed predefined limits. Intraday margin calls include both variation and initial margin.

- ASX Clear calculates margin when there is a significant market movement, with margin called from participants if the calculated call amount represents an erosion of initial margin of 40 per cent or greater, and the call amount exceeds \$100 000.
- ASX Clear (Futures) calculates intraday margin at 8.05 am, 11.10 am and 1.30 pm, and at other times if there are significant movements in the prices of individual contracts. Intraday margin is called whenever a participant's margin balance is eroded by more than a nominated threshold, with a minimum nominal erosion of \$1 million, increased from \$100 000 on 31 August 2015. The afternoon intraday margin run was introduced by ASX Clear (Futures) from 3 August 2015. In October 2014, the percentage threshold for calling intraday margin on futures positions was lowered such that a call is made if available margin has eroded by more than 25 per cent (previously 40 per cent). For OTC derivatives positions, intraday margin is calculated at scheduled intervals during the day and is called if the calculated call amount exceeds 10 per cent of margin held at the start of the day (or 20 per cent for cross-margined OTC derivatives/futures positions). In addition thresholds based on ASX's Internal Credit Ratings (ICRs) of participants have also been introduced for both futures and OTC participants.

During the Assessment period, there were 132 intraday margin calls at ASX Clear totalling \$141 million, and 1 692 calls at ASX Clear (Futures) totalling \$18.5 billion. For ASX Clear (Futures), this compares with 670 calls worth \$1.4 billion in 2013/14, the increase largely reflecting the changes in intraday call thresholds noted above. The average daily amount of intraday margin called for ASX Clear and ASX Clear (Futures) was \$0.6 million and \$72 million, respectively, or less than 1 per cent of average daily initial margin called at ASX Clear and around 2.5 per cent at ASX Clear (Futures).

Intraday margin calls reflect not only intraday changes in prices, but also intraday changes in participants' positions. Particularly large and frequent intraday margin calls could nevertheless indicate that initial margin did not adequately cover intraday exposures. ASX has investigated the large size and frequency of intraday margin calls on ASX Clear (Futures) and has concluded that it does not indicate inadequate margin cover. This view is supported by the results of backtesting (see below). Rather, one significant driver of the large number of intraday calls observed on ASX Clear (Futures) is the delay in some participants designating the new position to an account or otherwise allocating the new position to another clearing participant.¹⁰ As part of the changes to intraday margin processes implemented in August 2015, ASX Clear (Futures) has introduced functionality that will permit the return of collateral that has been called as part of an earlier intraday call if the positions to which the earlier call related have since been designated or allocated.

The CCPs conduct regular and ad hoc margin reviews to ensure that margin rates are set at levels appropriate to the prevailing risk environment. During the Assessment period, ASX Clear made two margin rate changes for its derivatives products and two changes to fixed margin rates for cash equities, while ASX Clear (Futures) increased the key margin parameter ('price scanning range') of its SPI 200 contract twice.

10 Any position that is not initially designated or allocated in this way is allocated to the original participants' house account. The allocation of a position to another clearing participant requires the receiving participant to accept the trade. A material delay in this acceptance often results in the threshold for an intraday margin call being breached.

To validate their margin rate settings, the CCPs perform regular backtesting and sensitivity analysis of their margin models. Backtesting uses observed historical data to assess the performance of a model over a given time period. Daily backtesting against actual dynamic portfolios compares the initial margin calculated on the portfolio of a participant or client to the variation margin calculated on that portfolio (representing the change in its value over the assumed holding period). ASX also uses backtests based on static portfolios which abstract from changes in portfolio composition. Under both types of backtest, when variation margin exceeds initial margin coverage, an exception is recorded. Further analysis is undertaken when an exception is recorded, both to investigate model performance and to determine whether any follow-up actions are required. More comprehensive periodic backtesting reviews allow ASX to examine the model in more detail and provide a basis for recommending changes to the model or further analysis. Results from the periodic backtesting of ASX's margin models during the Assessment period indicated that the observed number of exceptions were within expected levels (Table 7).

Table 7: ASX Margin Model Backtesting Results for 2014/15

Facility	Margin Model	Target Coverage (per cent)	Actual Coverage (per cent)
ASX Clear	CMM	99.7	99.93
ASX Clear	SPAN	99.7	99.8
ASX Clear (Futures) – House accounts	SPAN	99.7	99.95
ASX Clear (Futures) – Client accounts	SPAN	99.7	100
ASX Clear (Futures) – House accounts	OTC IRD VaR	99.7	99.75

ASX also carries out periodic sensitivity analysis to test the performance of its margin models beyond the boundaries of existing assumptions. ASX varies three main assumptions when conducting sensitivity analysis: the confidence interval, holding period and look-back period. During the Assessment period, sensitivity analysis of the OTC derivatives margin model supported an increase in the floor applied to a volatility scaling parameter, in order to make margin settings more robust to changes in the interest rate environment (see Section 3.5.1).

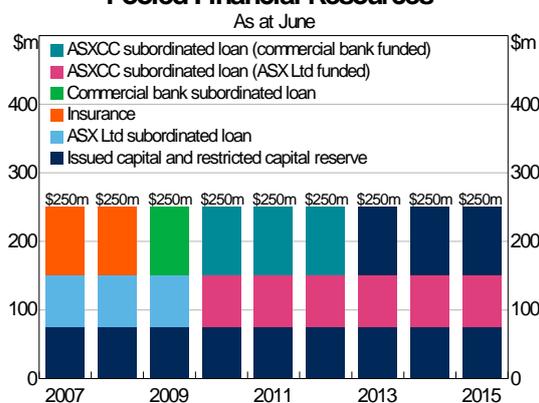
3.3.3 The maintenance of prefunded pooled financial resources

The margin and other collateral posted by a participant would be drawn on first in the event of that participant's default. Should this prove insufficient to meet the CCP's obligations, it may draw on a fixed quantity of prefunded pooled financial resources.

- During the Assessment period, ASX Clear's prefunded pooled financial resources totalled \$250 million (Graph 7). This comprised \$103.5 million of own equity, \$71.5 million paid into a restricted capital reserve from the National Guarantee Fund in 2005, and fully drawn-down subordinated loans totalling \$75 million provided by ASX Clearing Corporation (ASXCC), the CCPs' parent company.
- During the Assessment period, ASX Clear (Futures)' prefunded pooled financial resources totalled \$650 million (Graph 8). This included \$360 million of ASX capital, \$200 million of contributions from participants and a \$90 million subordinated loan from ASXCC.

Graph 7

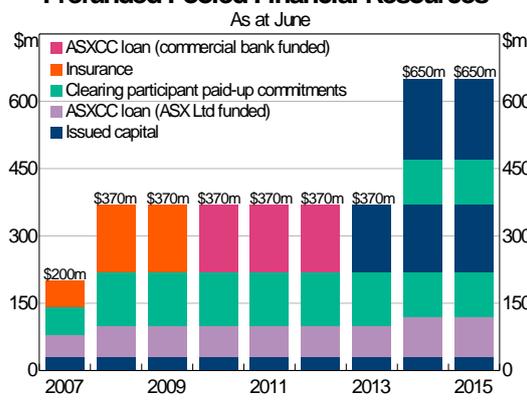
ASX Clear: Prefunded Pooled Financial Resources*



* The order of the bars reflects the order of application, starting from the bottom and working upward
Source: ASX

Graph 8

ASX Clear (Futures): Prefunded Pooled Financial Resources*



* The order of the bars reflects the order of application, starting from the bottom and working upward
Source: ASX

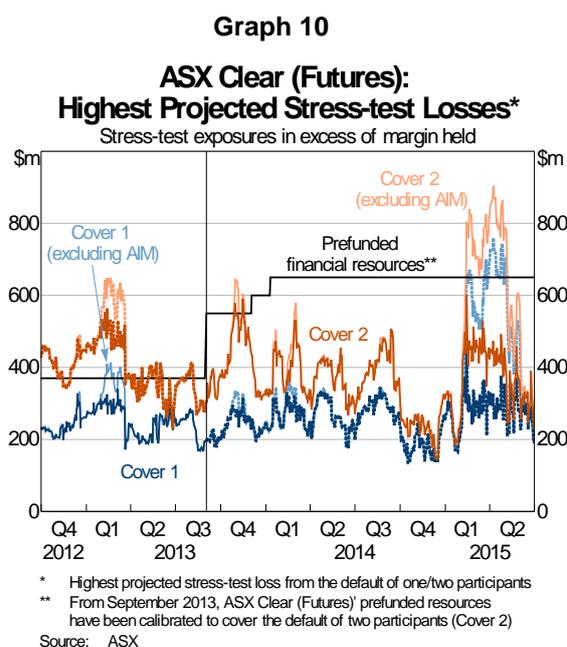
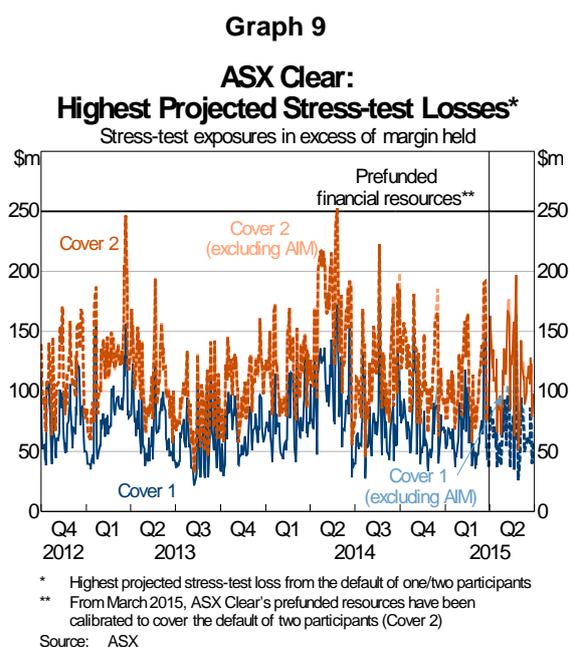
In order to assess the adequacy of its financial resources, the CCPs perform daily capital stress tests. In the case of ASX Clear, since 30 March 2015, these tests have compared available prefunded resources against the largest potential loss in the event of the joint default of two participants and their affiliates (previously one participant and its affiliates) under a range of extreme but plausible scenarios ('Cover 2'). ASX Clear (Futures) has sized its prefunded financial resources on a Cover 2 basis since August 2013. This reflects the Bank's supplementary interpretation of the FSS, under which both CCPs are deemed to be systemically important in multiple jurisdictions on the basis that they have sought (and, in April, were granted) regulatory recognition in the EU (see Section 3.6).

- ASX Clear's maximum projected stress-test losses remained well below the total prefunded pooled financial resources throughout 2014/15 (Graph 9).
- ASX Clear (Futures)' maximum projected stress-test losses exceeded prefunded pooled financial resources for 57 days in 2014/15, peaking at \$252 million above the level of prefunded pooled financial resources (Graph 10). These results were largely the result of client positions at one participant, and were covered by AIM called from the participant (see below). The positions that triggered these stress-test breaches were investigated by ASX Clear (Futures), which sought further information from senior management at the participant. From this investigation, ASX determined that the participant had the capacity to cover stressed exposures on the positions via AIM, but continued to monitor the position closely via daily analysis.

Monitoring of key risk indicators focused on the participant's CBPL (which places a lower bound on participant capital relative to exposures), stress-test exposure limit (STEL, which limits the size of positions that a participant can hold without posting additional collateral) and measures of concentration risk in particular products. Each of these metrics are used, respectively, by ASX to ensure that a large position established by a participant or its client does not lead to an unacceptable increase in the probability of a default, the potential loss given default, or the degree of difficulty in closing out a concentrated position in a default. While concentration triggers were not breached in this case, work by ASX to review its margining approach (Sections 3.5.1 and 4), the planned inclusion of a concentration multiplier in stress testing (Section 5) and ongoing review of ASX's approach to tiered concentration risks (Section 3.5.3) will help to ensure that concentration risks are appropriately managed. Since the stress test excesses were largely isolated to a single participant and covered by AIM, an increase in pooled financial resources was not considered necessary.

The CCPs call AIM when capital stress-test results are in excess of STELs, ensuring that any excess is fully covered. These limits are based on ASX's ICRs of participants. AIM can be called even when stress-test exposures do not exceed total resources: A-rated participants have STELs that are half of the total prefunded resources of each CCP, and lower rated participants have lower STELs.

ASX Clear (Futures) made STEL AIM calls on one participant over 101 days (as noted above), with the largest call totalling \$464 million. ASX Clear made STEL AIM calls on 27 days against five participants, with the largest totalling \$39.9 million.



The CCPs also perform daily liquidity stress testing in order to verify that they would have sufficient financial resources readily available to make payments in the event of a participant default.

- ASX Clear conducts separate liquidity stress tests based on a range of close-out scenarios to establish whether the CCP has access to sufficient financial resources to meet potential payment obligations, including those related to securities settlements. Since 30 March 2015, these tests have been conducted on a Cover 2 basis.¹¹ To be considered a breach, a stress-test result must exceed available financial resources (AFR) for more than three consecutive days, reflecting the three-day cash market settlement cycle. During the Assessment period, stress-test results at ASX Clear exceeded the AFR for 125 days although, since none of these exceeded the AFR for more than three days, no breaches were recorded. Despite these excesses, ASX Clear was able to cover stressed liquidity exposures throughout the Assessment period due to the availability of offsetting transaction arrangements (OTAs) to meet cash market settlement obligations (see Section 3.3.4).
- ASX Clear (Futures)' liquidity stress-test scenarios are based on the same scenarios as used in its capital stress tests. During the Assessment period, stress-test results exceeded the AFR for 57 days. These results were largely due to positions held by a single participant (as noted above), covered by AIM, and ASX concluded that its liquid resources remained adequate despite the excesses.

11 Different assumptions currently apply to A- and B-rated participants. ASX currently assumes that it would use liquidity from other participants provided via 'offsetting transaction arrangements' to meet cash market settlement obligations arising from a participant default (see Appendix A1.1, CCP Standard 7.3).

3.3.4 Recovery tools

In very extreme cases it is possible that prefunded pooled financial resources, or prefunded liquid resources, could be insufficient to fully absorb default-related losses, leaving the CCP with an uncovered credit loss or liquidity shortfall. ASX has developed enhanced recovery arrangements designed to address such a threat to its ongoing viability, due to come into effect in October 2015 (see Section 6). ASX's proposed approach for allocating an uncovered credit loss or liquidity shortfall following a participant default differs between the two CCPs, but applies the same basic sequencing.

- *Recovery Assessments.* The power to call for additional cash contributions from participants to meet uncovered losses and fund payment obligations, in proportion to the risk associated with positions held by participants prior to the default. Recovery Assessments are capped at \$300 million in ASX Clear and \$600 million in ASX Clear (Futures) (or \$200 million for a single default). This will replace an equivalent 'emergency assessment' power currently available to ASX Clear only.
- *Payment haircutting.* A tool, available to ASX Clear (Futures) only, allowing the CCP to reduce (haircut) outgoing payments to participants in order to allocate losses or a liquidity shortfall suffered on the defaulting participant's portfolio. There is no cap on the use of this tool.
- *Complete termination.* A reserve power that could be used to allocate losses or a liquidity shortfall if none of the above tools proved effective. Complete termination would involve tearing up all open contracts at the CCP and settling them at their current market value. Any residual losses or liquidity obligations of the CCP could be allocated by haircutting settlement payments to participants. Use of this tool would have a highly disruptive effect on the markets served by the CCP, so would be considered only as a last resort.

In addition, ASX Clear can address a liquidity shortfall relating to the settlement of securities transactions via the use of OTAs with participants due to receive funds in the settlement batch.¹²

3.3.5 Risk monitoring and compliance

The two CCPs actively monitor their exposure to financial risk. This includes monitoring of day-to-day developments regarding, among other things, financial requirements, risk profiles, open positions and settlement obligations to the CCPs. The CCPs carry out a range of participant monitoring spot checks and other examinations designed to validate the accuracy of the information that participants are required to submit to the CCPs. The CCPs also determine and review participants' ICRs, drawing in part on information provided by participants in their regular capital returns to ASX, and maintain a 'watch list' of participants deemed to warrant more intensive monitoring.

The CCPs have wide-ranging powers to sanction participants in order to preserve their financial and operational integrity. For example, the CCPs may suspend or terminate a participant's authority to clear some or all market transactions in the event of a default, or in the event of a breach of the CCP's Operating Rules and Procedures that could have an adverse impact on the CCP. The action taken in the event of a breach will depend on a number of factors, including the participant's history of compliance and whether the breach implies negligence, incompetence or dishonesty. Where a breach

12 Under the first leg of the OTA, ASX Clear would, in effect, re-deliver the stock to the relevant non-defaulting participant in return for payment equal to the amount of the payment obligation of ASX Clear to that participant. Under these arrangements, ASX Clear would agree to repurchase the stock the next business day under the second and final leg of the transaction.

has been identified and the participant has taken appropriate steps to rectify it, the CCPs will typically continue to monitor the participant closely for a period of time.

An example of these risk management and compliance activities is described in Section 4, which describes the enforcement action taken during the period against BBY, a participant in ASX Clear, and ultimately the steps taken to manage that participant’s default. Prior to the declaration of default, ASX Clear had taken a range of risk management and compliance actions to address concerns regarding BBY’s internal controls framework and, in the weeks leading up to the default, financial position. These included steps to manage down the participant’s clearing business. However, once BBY was placed into voluntary administration, ASX’s default management process was activated.

3.4 Operational Performance of the ASX Clearing and Settlement Facilities

ASX manages its operational risks in the context of its group-wide Enterprise Risk Management Framework, applying consistent operational risk controls across all of its CS facilities. Key operational objectives are a minimum availability of 99.8 per cent (99.9 per cent for Austraclear) and peak capacity utilisation of 50 per cent. These objectives were met during the Assessment period (Table 8). System availability was 100 per cent for all systems, while peak usage was below the target of 50 per cent for all systems.

Table 8: ASX CS Facility System Availability and Usage Statistics for 2014/15

Facility	Core system	Availability Per cent	Peak usage Per cent	Average usage Per cent
ASX Clear	DCS	100	23	11
ASX Clear / ASX Settlement	CHESS	100	20	15
ASX Clear (Futures)	Genium	100	11	7
ASX Clear (Futures)	Calypso	100	10	5
Austraclear	EXIGO	100	35	24

3.4.1 Minor incidents

The CS facilities experienced several incidents that did not affect system availability.

- On 1 September 2014, it was discovered that small errors had been made in calculating the derivatives margin requirements for ASX Clear participants. All of the affected participants were notified of the issue and advised of their correct margin obligations the following morning; all margin payable to ASX was received by the scheduled time (10.30 am). The issue was rectified on 2 September. ASX has implemented changes to its change management processes for future projects in response.
- An error introduced during a software release resulted in ASX Clear incorrectly calculating settlement cash flow obligations for a small number of participants on 18 December 2014. The affected participants were notified of the error the following day. An initial attempt to correct the issue was unsuccessful, and the participants were ultimately notified of their correct settlement obligations on 24 December, with the necessary adjustments settled later that day. In response, ASX has strengthened its change management controls and testing arrangements for software releases.

3.4.2 EXIGO insourcing

EXIGO is the core system used by Austraclear. During 2011/12, Austraclear commenced an insourcing project to take over EXIGO's third-level operational and software support (requiring expert knowledge of the core system), which is currently provided by NASDAQ OMX. This project is scheduled for completion in October 2015. Insourcing third-level support has the potential to significantly reduce operational risk by giving ASX control over future development of the system, both in terms of the nature and the timing of system enhancements. The insourcing project has also significantly simplified the system architecture through the removal of legacy components. Finally, this simplified architecture is expected to improve operational and recovery procedures.

Insourcing EXIGO has required that ASX manage the transition process and adequately resource third-level support for Austraclear. ASX recruited developers for this project and a senior developer from NASDAQ OMX was seconded to Sydney during the development phase. In addition, ASX staff spent time at the vendor's offices to acquire the specialist knowledge required to provide advanced support for EXIGO. While carrying out the insourcing project, ASX has retained the option to extend third-level support arrangements for as long as required. This option has been utilised to accommodate delays without compromising support for EXIGO, including delays created by the resource requirements of other projects and, most recently, to provide additional time for clients to update their systems.

3.4.3 Participation in the ASX CS facilities

Table 9 provides summary information on participation levels in the ASX CS facilities. These were little changed during the Assessment period. Participation requirements and the effect of participation structures on operational risk management are discussed in Section 3.5.7.

Table 9: ASX CS Facility Participation Levels

Facility	End June 2015	End June 2014	Comments
ASX Clear	37	36	At end of June 2015, there were 12 participants offering third-party or related-entity services; includes inactive participants.
ASX Clear (Futures)	20	19	Participants are predominantly large foreign banks and their subsidiaries. Eight participants clear OTC transactions and 15 clear exchange-traded derivatives.
ASX Settlement	86	79	Excludes temporary special-purpose participants.
Austraclear	846	847	At the end of June 2015, there were 178 full participants, 213 associate participants, 303 public trust participants and 152 special-purpose participants.

3.5 Material Developments and Recommendations

The ASX CS facilities have implemented a number of enhancements over the course of the Assessment period in response to recommendations and other regulatory priorities set out in the 2013/14 Assessment. In addition, the ASX CS facilities have made commercially driven improvements to existing processes and implemented changes related to the launch of new products and services.

3.5.1 CCP risk management

Risk management has again been an important focus for the ASX CCPs over the period, and for the Bank in its Assessment. The Bank made several recommendations in its 2013/14 Assessment related to model validation, stress testing and recovery planning. CCP risk management and recovery has also been a key focus of recent international policy work.

Internal model validation processes

The Bank's 2013/14 Assessment made a number of recommendations relating to ASX's model validation and stress-testing frameworks. ASX's model validation framework was significantly enhanced during 2013/14; this included further development of ASX's approach to the backtesting and sensitivity of its margin models, as well as the introduction of reverse stress testing. A key recommendation in the 2013/14 Assessment was to ensure that these enhancements were integrated into ASX's broader risk management framework. During the Assessment period, ASX has expanded and refined its reporting of key results from its internal model validation processes. This includes the reporting of key metrics from margin backtesting and reverse stress testing in ASX's monthly clearing risk management report for review by senior management.

Model validation techniques have also been used more broadly to support the analysis and further development of ASX's risk management approach. For example, reverse stress testing was used to analyse the market circumstances that could require the application of recovery tools (such as Recovery Assessments) and to define the sequencing of alternative tools (see Section 6). Sensitivity analysis of the margin model for OTC derivatives supported an increase in the floor applied to a volatility scaling parameter in the model, designed to make margin settings more robust to a change in the volatility of IRD. The increase in the volatility scaling floor followed a related change to ASX's margin policy in November 2014, to limit the need for procyclical changes in times of stress.

ASX made several other refinements to its model validation approach in 2014/15.

- ASX has developed a flexible framework for reverse stress testing that allows it to define particular combinations of assumptions that can be varied for the purposes of ad hoc analysis. These include increases in the size, or changes in the direction, of participants' positions and the magnitude of shocks applied to these positions, as well as changes to the number of participants that are assumed to default.
- In June 2015, ASX Clear extended its reverse stress-testing model to take better account of potential extreme sector-specific equity shocks (see Section 5.4.5).
- In July 2015, ASX Clear extended its reverse stress-testing model to take into account assumptions unique to liquidity stress testing for ETOs.

ASX updated its internal Model Validation Standard in July 2015 to take into account enhancements to ASX's model validation approach during the year.

External model validation

Another key recommendation of the 2013/14 Assessment was for ASX to carry out planned validations of ASX's credit and liquidity stress-testing and margin models by an external independent expert.

Credit stress test

Following completion of the external credit stress-test validation, ASX implemented a number of enhancements to its stress-testing framework in July 2015, with a second phase of enhancements to be

implemented over the coming period. A more detailed description and assessment of ASX's enhanced capital stress-testing approach, including recommended actions in the spirit of continuous improvement, is set out in Section 5.

Also related to the use of stress tests by ASX, during the Assessment period ASX formally removed references from its internal standards and procedures providing for highly rated (i.e. A-rated and B-rated) participants at both ASX Clear and ASX Clear (Futures) to receive discounts on their STEL AIM calls. These discounts had not been applied since April 2010, after volatility in the S&P/ASX 200 increased significantly above historical levels. ASX had determined in the previous Assessment period that it would no longer apply these discounts even in apparently normal market conditions.

Liquidity stress test

The initial external validation of ASX's liquidity stress-testing approach was also completed during the Assessment period. This validation focused primarily on the liquidity stress test for ASX Clear, since the liquidity stress test for ASX Clear (Futures) is a variant of its capital stress test. ASX Clear has developed further analytical tools to support sensitivity analysis of its liquidity stress-testing approach in light of the recommendations from the external validation, as well as the Bank's recommendations and other regulatory priorities relating to liquidity stress testing set out in the 2013/14 Assessment. This includes tools to separately measure stressed liquidity obligations relating to securities- and derivatives-related transactions, and the development of reverse stress-testing capabilities.

- ASX Clear has two potential sources of liquidity to meet payment obligations in the event of a participant default: \$400 million in AFR, which can be used to meet obligations on both derivatives and cash securities; and OTAs, which can be used to meet settlement-related obligations on cash securities only. ASX Clear's current liquidity stress-testing approach assumes that OTAs will be used to meet settlement-related payment obligations on cash securities positions of A- and B-rated participants. The liquidity stress test therefore models the extent to which the AFR can meet derivatives-related obligations of all participants and the cash securities-related obligations of C-, D- and E-rated participants. ASX Clear's new analytical tools can separately identify the securities- and derivatives-related components of its stressed liquidity obligations, providing supplementary information on the degree to which it would rely on OTAs to meet payment obligations in the event of a participant default, including the default of an A- or B-rated participant. The Bank is continuing to discuss with ASX its approach to modelling this element of its liquidity risk management arrangements.
- ASX Clear has developed a reverse stress-testing framework for its liquidity needs, which allows it to consider the liquidity impact of varying the magnitude of price and volatility shocks, as well as changes to the number of participants that are assumed to default. ASX is considering further extensions to its reverse stress-testing approach to allow it to systematically examine the key assumptions underlying its liquidity stress tests.

ASX Clear and ASX Settlement plan to develop additional disclosures to assist participants in understanding and better managing their contingent liquidity exposures arising from the management of a participant default. This will include information on the potential liquidity impact of the use of the OTAs, as well as other tools to address a liquidity shortfall which will be implemented as part of broader enhancements to ASX's recovery arrangements in October 2015 (see Section 6).

Recommendation. ASX Clear is encouraged to continue to refine and enhance the sensitivity analysis of its liquidity stress-testing model and its reverse stress-testing framework for liquidity, and to continue to integrate these into its broader stress-testing and liquidity management processes. This includes examining further the sensitivity of outcomes to certain underlying assumptions. One matter in particular that ASX Clear is encouraged to consider further is how it models the degree of reliance on OTAs in its liquidity risk management framework. ASX Clear is also encouraged to continue to review its approach to liquidity stress testing in light of the external validation of its liquidity stress-testing model and evolving international best practice, including outcomes of CPMI-IOSCO work on liquidity stress testing.

ASX Clear is encouraged periodically to review its arrangements to address a liquidity shortfall, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.

ASX Clear is encouraged to carry out plans to develop additional disclosures to assist participants in understanding their contingent exposure to the use of tools to address a liquidity shortfall.

Margin

Independent external validations of ASX's SPAN and OTC IRD margin models and the ASX Clear Derivatives Pricing System were completed during the Assessment period. An external validation of the CMM model will be conducted in the 2015/16 Assessment period. The Bank will discuss the findings of these validations with ASX together with relevant experience gained on margining arising from the BBY default (see Section 4) and CPMI-IOSCO work on margin models (see Box A). It is expected that these discussions might cover, among other things, the key parameters used to calibrate margin models, such as the assumed holding period and the sample of price and volatility moves used in calculations (i.e. the look-back period). In the BBY default, not all positions were closed out or transferred within the time period assumed in ASX Clear's margin models, although this at least in part reflects ASX's assessment of the appropriate close-out strategy, taking into account prevailing market conditions (see Section 4). The length of the look-back period in margin models is a key parameter in mitigating the risk that margin settings lead to destabilising procyclical changes in times of stress.

Recommendation. Each ASX CCP is encouraged to review its margining approach in light of: the external validation of its margin models; evolving international best practice, including outcomes of forthcoming CPMI-IOSCO work on margining; and, for ASX Clear, experience gained from the BBY default. The review should examine key parameter assumptions, including the holding and look-back periods, and, for ASX Clear, mitigants against shortfalls in relation to individual client accounts.

Recovery

In order to meet emerging international standards, the Bank's 2013/14 Assessment recommended that ASX take steps to enhance the recovery plans of its CS facilities; that is, their arrangements to return to viability in the event of an extreme financial shock. In response, in late 2014 and early 2015, ASX consulted on changes to its CCPs' Operating Rules to enhance their recovery arrangements. These enhancements, due to take effect in October 2015, are discussed in detail in Section 6, along with recommendations for further review and enhancement.

Resolution

The Government, on the advice of the Council of Financial Regulators (CFR), has progressed work on proposals to establish a special resolution regime for FMIs. A February 2015 consultation paper sought stakeholder views on proposals for a resolution regime that would:¹³

- extend to all domestically incorporated and licensed CS facilities, including all four ASX facilities
- nominate the Bank as the resolution authority for CS facilities, with an overarching objective to maintain overall stability in the financial system and an additional key objective to maintain the continuity of critical FMI services
- align the powers of the resolution authority and safeguards under the regime with the Financial Stability Board's (FSB's) *Key Attributes of Effective Resolution Regimes for Financial Institutions* (Key Attributes).

The Government will consider its response to the FMI resolution consultation as part of its broader response to the recommendations of the Financial System Inquiry. In parallel, it is expected that the CFR will develop a high-level proposed response to consultation.

Each ASX CS facility will be required to ensure that its operational arrangements are able to support resolution actions under the proposed Australian FMI resolution regime once operative. The CS facilities have therefore already introduced standard clauses into their agreements with critical service providers requiring that they give the Bank notice of any intention to terminate the agreement as a consequence of the facility's insolvency or failure to meet its obligations. This is intended to give the Bank an opportunity to take action to remedy the breach or otherwise ensure continued service provision under the proposed FMI resolution regime. Once legislation to establish a special resolution regime for FMIs has been introduced, ASX should review its operational arrangements more broadly to ensure that they are consistent with the form of the regime.

Recommendation. To continue to meet the requirements of CCP Standard 16.11 and SSF Standard 14.11, each ASX CS facility will need to review its operational arrangements in light of the proposed establishment of a special resolution regime for FMIs in Australia. In particular, each facility will need to ensure that its operations are organised in such a way as to facilitate effective crisis management actions under that regime once finalised.

ASX Clear transition to Cover 2

On 30 March 2015, ASX Clear transitioned to the higher Cover 2 standard for covering its credit and liquidity exposures, consistent with obligations for a facility that is systemically important in multiple jurisdictions (see Section 3.6). Under the Cover 2 standard, ASX Clear calibrates both its pooled prefunded financial resources and its liquid resources to cover the joint default of the two participants and affiliates that would lead to the largest potential credit exposure or payment obligation under extreme but plausible stressed market conditions. Previously, ASX Clear calibrated its financial resources to cover the default of the single largest participant and its affiliates.

While the transition did not necessitate an increase in the level of prefunded financial resources, ASX Clear adjusted the STELs of its A- and B-rated participants; the maximum STEL now represents one half

13 See Australian Government (2015), 'Resolution Regime for Financial Market Infrastructures: Consultation Paper', February, available at <<http://www.treasury.gov.au/ConsultationsandReviews/Consultations/2015/Resolution-regime-for-financial-market-infrastructures>>.

of ASX Clear's total pooled prefunded financial resources, reflecting that these prefunded resources should be sufficient to cover two participant defaults (and the default of their affiliates). To support the transition to the higher minimum standard for coverage of stressed liquidity exposures, ASX Clear obtained an additional \$100 million in liquid resources through a committed liquidity facility with ASX Limited, which is funded by one of the major banks.

Commingled financial resources in ASX Clear (Futures)

During the Assessment period, ASX Clear (Futures) reviewed the case for continued commingling of pooled prefunded financial resources across exchange-traded and OTC derivatives products, consistent with a regulatory priority identified in the Bank's 2013/14 Assessment.

The review noted that exposures from positions in OTC derivatives remain small relative to those generated by futures (the former accounting for about 2 per cent of total initial margin), with all OTC participants also active in the futures market. ASX therefore also concluded that it remains appropriate for these products to continue to share a commingled default fund.

The review also concluded that the size of ASX Clear (Futures)' financial resources remained appropriate. STEL breaches were concentrated in a single participant, making AIM the appropriate mechanism to cover these exposures under a 'user pays' principle (see Section 3.3.3).

Box A: International CCP Workplan

In light of the increasing systemic importance of CCPs, the FSB has been taking a deeper interest in CCP resilience, recovery and resolution. The Chairs of CPMI, IOSCO and the Basel Committee on Banking Supervision (BCBS), along with the chairs of the FSB's Standing Committee on Supervisory and Regulatory Cooperation and Resolution Steering Group (ReSG), have developed a CCP Workplan.¹⁴

Key elements of the Workplan include:

- evaluating existing measures for CCP resilience, including loss-absorption capacity and stress testing
- conducting a stock take of existing CCP recovery mechanisms, including loss allocation tools, and considering whether there is a need for more detailed standards
- reviewing existing CCP resolution regimes and resolution-planning arrangements, and considering whether there is a need for more detailed standards or for additional prefunded financial resources in resolution
- analysing the interconnections between CCPs and the banks that are their clearing members, and potential channels for transmission of risk.

CPMI and IOSCO are responsible for matters relevant to the resilience and recovery of CCPs, but with close engagement with the FSB ReSG on recovery planning.

The CPMI-IOSCO work is well underway, with 34 CCPs from 18 CPMI-IOSCO jurisdictions responding in June to a detailed stock take questionnaire on stress testing, and more recently to follow-up questionnaires on margining, recovery planning, loss-absorption and CCP 'skin-in-the-game' (i.e. CCP

¹⁴ The elements of the workplan are set out in an April 2015 letter from the FSB Chair to G20 Finance Ministers and Central Bank Governors, available at <<http://www.financialstabilityboard.org/wp-content/uploads/FSB-Chairs-letter-to-G20-April-2015.pdf>>.

capital contributions to the default fund).¹⁵ Responses to the questionnaires are now being analysed by members of the CPMI-IOSCO Policy Standing Group (PSG).

The Workplan is an extensive program that is directly relevant to the work the Bank has been doing with the ASX CCPs on stress testing and recovery planning (see Sections 5 and 6). Accordingly, the Bank has been closely involved in the work as a member of the PSG. The ASX CCPs have contributed comprehensive responses to each of the questionnaires.

The PSG's work will also be informed by parallel work on CCP risk management arrangements being undertaken by CPMI-IOSCO as part of a broader program to monitor the implementation of the PFMI.¹⁶ This exercise is focused on the consistency of CCPs' risk frameworks with requirements established in the Principles in the PFMI. Ten derivatives CCPs are being assessed in this exercise, including ASX Clear (Futures).

The ReSG is the primary forum for matters related to the resolution of CCPs, informed by expertise provided by CPMI and IOSCO. This group has so far been examining steps taken by FSB member jurisdictions to implement special resolution regimes for FMIs. Given the work underway to establish a special resolution regime for FMIs in Australia, including CCPs, the Bank is also taking a close interest in this work (see Section 3.5.1).

Finally, the work on interconnections is largely an analytical exercise, which will draw on resources from across CPMI, IOSCO, BCBS and the FSB.

3.5.2 Governance and comprehensive management of risks

A number of enhancements to the governance of risk and other aspects of the ASX CS facilities' activities have been implemented during the Assessment period. These enhancements address regulatory priorities identified in the 2013/14 Assessment as well as respond to broader changes in the governance requirements of the ASX Group.

User governance

ASX has continued work to establish and enhance formal mechanisms for user governance of its CS facilities.

In light of the updated supplementary interpretation of the FSS issued in October 2014 (see Section 3.6), ASX Clear established a Risk Consultative Committee comprising representatives from 10 clearing participants and up to five clients in March 2015. The committee is consulted on material changes to default management processes, the margin methodology, the default fund, position or liquidity limits, participation criteria, new products, and other changes affecting either ASX Clear's risk model or Operating Rules. The Risk Consultative Committee's proposals and recommendations are presented to the ASX Clear Board, which is required to justify any decision not to follow the committee's advice.

The ASX Clear Risk Consultative Committee is modelled on the corresponding committee established for participants and clients of ASX Clear (Futures) in April 2014. During the Assessment period, the ASX Clear (Futures) Risk Consultative Committee introduced criteria to admit client representatives. To date

15 The press release announcing the commencement of the stock take exercise on stress testing is available at <<http://www.bis.org/press/p150311.htm>>.

16 The press release announcing the commencement of this implementation monitoring work is available at <<http://www.bis.org/press/p150709.htm>>; details of the broader CPMI-IOSCO implementation monitoring program are available at <http://www.bis.org/cpmi/info_mios.htm?m=3%7C16%7C599>.

no clients have met the relevant criteria to join the committee, in part due to the requirement that client representatives clear their trades via an individual client account.

Code of Practice

ASX released its *Code of Practice for Clearing and Settlement of Cash Equities in Australia* (the Code) in August 2013. The Code was developed in response to the recommendations made by the CFR and the Australian Competition and Consumer Commission (ACCC) – together, the Agencies – in their 2012 review of competition in clearing cash equities.¹⁷ The Code commits ASX to engage with users via an advisory Forum and a supporting Business Committee, and to maintain transparent and non-discriminatory pricing of, and terms of access to, its cash equity clearing and settlement services.¹⁸

The Forum and Business Committee continued to provide input on the development of ASX's clearing and settlement services and infrastructure during 2014/15. One of the key strategic initiatives progressed by the Forum and Business Committee during the past year was a move to a two-day settlement cycle for cash equities from the current three-day cycle; this is scheduled to be implemented in March 2016 (see Section 3.5.6). ASX also continued to publish management accounts for its cash market clearing and settlement businesses, and made enhancements to its arrangements for handling confidential information received from unaffiliated market operators. In addition to its commitments under the Code, ASX has also been working with Chi-X Australia to extend the existing clearing and settlement access arrangements to certain non-ASX listed securities. In December 2014, ASX consulted on a number of operational improvements to the Code, including to give greater prominence to the Business Committee. ASX has advised that feedback was supportive of the proposed amendments, but the changes will be reviewed in light of the government's response to the CFR's 2015 review of competition in clearing of Australian cash equities.¹⁹

Clearing and settlement risk frameworks

In 2013/14, ASX established a new Settlement Risk Policy Framework, which provides a formal structure for the development, governance and review of settlement risk policies and standards. This complements a similar Clearing Risk Policy Framework established during the 2012/13 Assessment period. During 2014/15, ASX developed a series of new policies and standards under the Settlement Risk Policy Framework, covering matters such as participation requirements, settlement and reporting processes, and default management. Policies and standards under the Clearing Risk Policy Framework were also reviewed or refreshed in 2014/15, including the introduction of a new policy governing client segregation arrangements.

3.5.3 Participant default rules and procedures

The ASX CCPs' Default Management Framework (DMF) is intended to assist in the management of a clearing participant default and covers each stage of a default from its identification through to its conclusion. In the 2014/15 Assessment period, ASX has updated the DMF to take into account the use of OTAs in ASX Clear and changes to client segregation arrangements. A more comprehensive update

17 The CFR's advice on competition in clearing of the cash equity market and the final report of the 2012 Review are available at <<http://www.treasury.gov.au/PublicationsAndMedia/Publications/2013/competition-of-the-cash-equity-market>>.

18 ASX's Code of Practice is available at <http://www.asx.com.au/cs/documents/Code_of_Practice_9Aug13.pdf>.

19 The CFR's February 2015 consultation paper is available at <<http://www.cfr.gov.au/publications/cfr-publications/2015/review-of-competition-in-clearing-australian-cash-equities.pdf>>.

of the DMF is due to take place in 2015/16 to take into account enhancements to ASX's recovery arrangements (see Section 6) and experience gained from the default of BBY (see Section 4).

Managing the default of BBY Limited

In May 2015, ASX Clear employed its default management procedures to deal with the appointment of a voluntary administrator to a broker participant of ASX Clear, BBY. This followed two weeks of action by ASX to manage down BBY's clearing business after BBY had missed a deadline for a CBPL-related AIM call.

ASX managed BBY's default through a combination of client transfers and the close out or expiry of remaining positions, with all close-out losses sufficiently covered by margin held and without any evident market impact.

The default management process nevertheless highlighted several matters relevant to ASX's risk management and default management arrangements that are worthy of further consideration. These are described in Section 4.

OTC derivatives Default Management Group

In managing a default involving an OTC participant, ASX Clear (Futures)' intention would be to hedge the defaulter's OTC derivatives portfolio (including any cross-margined futures), before auctioning the hedged portfolio to non-defaulting participants. To provide advice and assist with the hedging and auction process, ASX would convene the OTC interest rate swaps (IRS) Default Management Group (DMG), comprised of trading professionals drawn from non-defaulting OTC participants. The DMG is involved directly in regular (at least annual) default simulations, including testing of the auction process, the first of which was held in June 2014. The Bank attended the DMG's second annual default simulation exercise in July 2015.

Segregation and portability – account structure

The FSS require the ASX CCPs to offer account structures that support the segregation of client positions and collateral from those of their clearing participant. Under the Bank's supplementary interpretation of the FSS (see Section 3.6), each CCP must also allow clients to hold excess collateral directly with the CCP. During the Assessment period, ASX Clear and ASX Clear (Futures) completed work to bring their client account structures into line with these requirements, and fully address recommendations contained in the Bank's 2013/14 Assessment.

ASX Clear (Futures)

With effect from July 2014, ASX Clear (Futures) has offered clients of both OTC and exchange-traded futures participants the choice of holding their positions in either an individually segregated account or a client omnibus account. Under the standard individual client account structure, ASX Clear (Futures) guarantees clients the full value of initial margin posted against their positions in the event of the default of their clearing participant. However, while ASX Clear (Futures) can accept excess client collateral, this collateral cannot be attributed to individual clients.

Arrangements to be introduced in September 2015 extend this standard client account structure by allowing for the individual segregation of cash and securities lodged as margin or excess collateral. While all client collateral will continue to be operationally managed in a single commingled account, ASX Clear (Futures) would transfer or return the total value of collateral attributed to an individual client account (net of any close-out costs). In the event of a clearing participant default, ASX Clear (Futures) would transfer or return equivalent securities to those that had been attributed to clients of that participant, provided that they hold individual accounts protected in this way. These

arrangements are consistent with the supplementary interpretation of the FSS, and address the recommendations set out in the Bank's 2013/14 Assessment.

Use of individually segregated account structures in ASX Clear (Futures) remains low at present. Future growth in the use of individual client accounts would provide ASX Clear (Futures) more direct information on the risks associated with participants clearing large or concentrated positions on behalf of clients. The Bank will continue to discuss ASX's approach to addressing concentration risks associated with tiered participation.

ASX Clear

In May 2015, ASX Clear completed the implementation of arrangements to ensure that its existing commingled house/client account structure for cash market transactions would offer clients materially equivalent protections to those offered by segregated omnibus accounts. These arrangements were introduced in response to concerns raised in a July 2013 stakeholder consultation that omnibus segregation for the cash market would lead to increased operational costs and unnetting of margin, while delivering minimal benefits in terms of protection for clients of participants. The enhanced client protection arrangements were implemented in two phases. The first phase, which enshrined existing best practice in processing client trades during the pre-settlement period, came into effect in April 2014. The second phase, which addresses the recommendations set out in the Bank's 2013/14 Assessment, included changes to settlement processing designed to ensure that clients remain beneficially in possession of either securities or corresponding funds for all but a brief window during the settlement period.²⁰

In light of the Bank's supplementary interpretation of the FSS (see Section 3.6), ASX Clear also plans to implement arrangements that will allow excess client cash collateral posted against derivatives positions to be held directly with ASX Clear and attributed to an individual client account.²¹ Under these arrangements, ASX Clear would transfer or return to the participant's client trust account any excess collateral that had been attributed to an individual client account (net of any close-out costs). ASX is targeting an implementation date in November 2015.

Recommendation. In order to fully observe CCP Standard 13, ASX Clear should complete the implementation of planned enhancements to client segregation arrangements that support the lodgement of excess client cash collateral in respect of derivatives positions.

ASX Clear is also encouraged to consider any implications for portability arrangements arising from management of the default of BBY.

20 Under the new arrangements, participants are required to fund any movements of beneficially held client stock to the participant's settlement account on the day that the movement occurs, by placing the required amount into trust for the client. The changes to messaging in support of this process allow participants to pre-schedule movements of beneficially held client stock to their settlement account. These 'pre-positioning' transactions settle in the first stage of the batch process, with Payment Providers being notified of a net amount to be transferred to the client trust account.

21 Current arrangements already enable non-cash collateral (including excess collateral) lodged with ASX Clear in respect of derivatives transactions to remain under the beneficial ownership of clients. These arrangements satisfy the Bank's supplementary interpretation of the FSS for non-cash collateral.

3.5.4 Business and investment risks

Investment policy

In accordance with the treasury investment policy endorsed annually by the CS Boards, ASXCC invests both cash margin collected and pooled risk resources in short-dated highly rated assets. The policy establishes counterparty eligibility criteria and sets investment limits to control investment counterparty risk. In previous Assessments, the Bank had expressed concerns that, notwithstanding limits on both the absolute level and share of exposure to each of the four large domestic banks, the policy still allowed relatively large and concentrated credit exposures to these banks. In this context, ASX carried out a review of its treasury investment policy during the 2012/13 Assessment period, which concluded that a gradual move towards lower concentration of investments in the major banks and a greater reliance on secured investments would be appropriate. The Bank's 2013/14 Assessment recommended that ASX implement plans to further reduce the concentration of unsecured exposures to the large domestic banks under its treasury investment policy, noting that the Bank had opened a dialogue with ASX on the detail of its expectations for the credit and liquidity risk profile of ASXCC's investment portfolio.

During 2014/15, the Bank continued this dialogue with ASX on changes to its treasury investment policy. This dialogue clarified the Bank's expectation that ASX should:

- limit its credit exposures to individual non-government investment counterparties/issuers to the level of capital set aside for non-default or general business risk losses
- ensure that other investments are with government-related obligors or secured by assets issued by government-related or other highly creditworthy obligors, subject to prudent concentration limits
- ensure that the CCPs' minimum liquid resource requirement (under CCP Standard 7.3) is invested in, or secured by, government/semi-government securities or cash, with other investments able to address effectively any uncovered liquidity shortfalls (e.g. be investments in, or secured by, securities eligible for repo with the Bank).

ASX has now endorsed further staged revisions to its treasury investment policy designed to meet the Bank's expectations for the credit and liquidity risk profile of ASX treasury investments by end 2016/17. The time frame for implementation reflects the time required for an orderly transition to the desired investment profile, including time to develop secured investment arrangements with a broad range of counterparties. By end 2016/17, individual unsecured exposures to non-government related issuers or counterparties would be limited to the level of business risk capital held across the two CCPs (currently \$75 million), meaning that ASX could absorb losses arising from the default of any single investment counterparty or issuer. In the unlikely event that further losses arose (for example via the default of additional investment counterparties), ASX's enhanced recovery arrangements provide for the allocation of these to participants (see Section 6).

Recommendation. In order to fully observe CCP Standard 15, ASX Clear (Futures) and ASX Clear should, by end 2016/17, implement plans to:

- limit unsecured exposures to individual non-government investment counterparties/issuers to the level of capital set aside for non-participant-default or general business risk losses
- ensure that other investments are with government-related obligors or secured by assets issued by government-related or other highly creditworthy obligors, subject to prudent concentration limits
- ensure that the CCPs' minimum liquid resource requirement (under CCP Standard 7.3) is invested in, or secured by, government/semi-government securities or cash. Other investments should be able to address effectively any uncovered liquidity shortfalls (e.g. be investments in, or secured by, securities eligible for repo with the Bank).

Financial results

The continued profitability of the ASX Group provides an important mitigant against general business risk for the ASX CS facilities. ASX Limited's statutory profit after tax for the 2014/15 financial year was \$397.8 million, up 3.8 per cent from the previous year. This was largely due to higher operating revenue, driven by an increase in listings, as well as income from cash market trading, clearing and settlement services. Operating expenses were up 4.2 per cent over the period, mainly due to an increase in staff costs.

During 2014, ASX implemented fee reductions for both its electricity and interest rate futures products. The impact of these changes over the year to June 2015 was \$17.8 million, which was partly offset by the removal of other rebates. Growth in derivatives and OTC trading also offset some of this loss in revenue. ASX has also invested heavily in upgrading its trading platforms and post-trade services; capital expenditure was \$44.4 million in 2014/15, and is expected to be \$45-50 million in the following year (see Section 3.5.5).

Business strategy

ASX manages its strategic business risks at a group-wide level, communicating its business strategy to investors, participants and other stakeholders in accordance with its continuous disclosure obligations as a listed company. The key elements of the ASX strategy are to:

- continue development of new products and services in Australian and New Zealand dollar financial markets and expand the range of products and services to intermediaries and end-investors (see Section 3.5.5)
- provide globally connected financial infrastructure through investment in its technology platforms (see Section 3.5.6)
- deliver outstanding customer experience, including via ASX's implementation of 12 customer forums across all of its main businesses (see Section 3.5.2) and the establishment of a dedicated customer experience team (see Section 3.5.6).

3.5.5 New products and services

ASX launched, or further developed, several new products and services during the 2014/15 Assessment period.

- **OTC Derivatives Clearing.** Use of the ASX Clear (Futures) OTC IRD clearing service grew significantly over 2014/15. The service offers clearing of Australian dollar-denominated IRS referencing either the bank bill swap rate (BBSW) or the overnight indexed swap rate. The number of participants using the service remained at eight during the Assessment period, although a number of participants significantly increased their volume of OTC derivatives cleared during the year. At the end of the 2014/15 Assessment period, the notional value of OTC derivatives trades outstanding was \$441 billion, compared with \$124 billion at the end of June 2014.²² Although client clearing is available within the service (see Section 3.5.3), activity currently remains focused on the inter-dealer market.

ASX has also continued to monitor its process for 'real-time' novation of IRD transactions submitted for clearing. To manage the additional risk exposure arising from real-time novation, ASX Clear (Futures) places a limit on the acceptable size of new transactions, performs approximately hourly portfolio exposure checks, and has the ability to prevent further novation until an intraday margin call is met. ASX has determined that its real-time novation approach remains appropriate for the current level of activity in the service.

- **ASX Collateral.** Use of ASX's centralised collateral management service also grew during 2014/15. This service automates the optimisation and allocation of collateral, with title remaining and settlement continuing to take place in Austraclear. An extension to collateral settled by ASX Settlement and links to global collateral pools is planned in due course, although ASX's focus remains on growing use of the service for Austraclear securities at present.
- **Renminbi (RMB) settlement.** On 28 July 2014, ASX launched a settlement service in Austraclear for Chinese RMB payments, developed in partnership with Bank of China's Sydney branch. Interest in the offshore use of RMB for both trade and financial market transactions has grown following Chinese reforms, including a gradual move towards a more market-determined exchange rate and incremental liberalisation of the capital account. Settlement of payments occurs across the books of Bank of China, which, in February 2015, was appointed the official RMB clearing bank in Australia by the People's Bank of China. The Foreign Currency Settlement Service is designed so that an interruption to RMB settlement would not interfere with Austraclear's systemically important AUD activity. While users of the service remain exposed to risks associated with settlement in commercial bank money, ASX has obtained a legal opinion confirming that the finality of foreign currency settlements in Austraclear is protected under Part 2 of the *Payment Systems and Netting Act 1998* (PSNA), and has taken steps to ensure that the residual risks assumed by users of the service are fully disclosed. The Bank has judged that money settlement arrangements remain appropriate for the current level of activity in the service.
- **Deliverable Swap Futures (DSFs).** ASX Clear (Futures) plans to introduce clearing of DSFs in late 2015. DSFs are futures contracts that result in the delivery of an at-the-money OTC IRS at expiry. These contracts will allow users to gain exposure to the underlying swap rate, generally with lower collateral and initial margin requirements compared with a standard OTC swap. These futures products will transition to OTC products at the point of expiry; participants must therefore either have OTC clearing arrangements established, or close out their positions at least five days prior to expiry.

²² These figures represent the notional value of all outstanding novated OTC IRD trades (i.e. the two novated contracts created by the clearing of a bilaterally agreed trade are counted separately).

- **Total Return Single Stock (TORESS) Options.** ASX plans to launch exchange-traded TORESS options in November 2015. TORESS options are designed to offer exposures that directly mirror returns on the underlying stock, with a lower upfront investment. In contrast to ordinary ETOs, TORESS options will be cash settled upon exercise, and any ordinary dividends on the underlying will be adjusted for by a cash transfer between the seller and the buyer of the option. The cash settlement of the dividend amount is intended to facilitate the pricing of the options by eliminating dividend pricing risk. Margin requirements will be calculated using the SPAN methodology, allowing for margin offsets between TORESS options and standard ETOs. While ASX will initially only offer TORESS low exercise price options (LEPOs) on selected ETO classes, it is also considering introducing TORESS low strike ETOs in 2016.²³

3.5.6 Operations

During the Assessment period, ASX progressed significant changes to a number of its key systems and operational arrangements, while the Bank continued its dialogue with ASX on its cyber resilience approach.

Technology transformation

In February 2015, ASX announced a technology transformation project to upgrade all of its major trading and post-trading systems over the next three to four years. The project is intended to rationalise ASX's core technology onto a single services platform, removing interdependencies that currently exist between unrelated systems. The first stage of the project will upgrade ASX's trading, risk management and market monitoring systems.

The new risk management system is of particular interest to the Bank. The system is expected to deliver ASX the capability to calculate exposures and margin requirements in real time. As ASX progressively develops these capabilities over the next two to three years, it will consider how to integrate more frequent margin and stress-test calculations into a 'real-time risk management' approach that removes the potential for delay in covering intraday changes to exposures. An initial release of the new system was used to support ASX's OTC derivatives default management fire drill in July (see Section 3.5.3).

A subsequent phase of the technology transformation project will focus on ASX's clearing and settlement platforms. This includes the consolidation of derivatives clearing onto a common platform and the replacement of the CHES clearing and settlement system for cash equities. Replacement of CHES is an important element of ensuring that ASX's core clearing and settlement infrastructure is aligned with or exceeds international best practice, and that its performance, resilience, security and functionality meet the needs of its users on an ongoing basis. Adoption of internationally accepted messaging standards alongside the renewal of CHES was recommended in ASIC's and the Bank's 2014 joint assessment of the ASX CS facilities against the PFMI.²⁴

Given the significance of the technology transformation project for ASX's critical trading, clearing, settlement and risk management systems, the ASX Limited Board and CS Boards will receive regular status updates throughout the life of the project. ASX's Audit and Risk Committee, together with the executive-level Enterprise Risk Management Committee, oversees the management of operational

²³ A LEPO is a European-style call option (exercisable only on the expiry date) with a strike price of one cent.

²⁴ See ASIC and RBA (2014), *Assessment of ASX Clearing and Settlement Facilities against the Principles for Financial Market Infrastructures*, September, available at <<http://www.rba.gov.au/payments-system/policy-framework/principles-fmi/assessments/asx/2014/index.html>>.

and strategic risks associated with execution of the project, with internal and external audit providing review of key elements. ASX's Enterprise Portfolio Steering Committee provides executive-level oversight of project management, including to determine the prioritisation of resourcing for key project elements. ASX has formally adopted an 'Agile project management' approach for its technology transformation. This seeks to streamline decision making by bringing together the human and technological resources that support the design, development and testing processes, and delivering project outputs in a series of incremental stages (so-called 'sprints').

The Bank is receiving detailed monthly updates on the progress of the technology transformation project. These updates also provide an opportunity for the Bank to examine prioritisation decisions, resourcing challenges, interdependencies with day-to-day business-as-usual processes, and potential change-management issues. This includes ensuring that investment in the replacement of CHES is appropriately prioritised. The Bank is separately engaging more deeply with ASX on the design, specifications and rollout of the new risk management system. The Bank has expressed a particular interest in how the real-time capabilities of the new system will be reflected in changes to risk management policies and processes.

Customer support and operations

ASX launched a new customer support centre in April 2015, within ASX's Australian Liquidity Centre.²⁵ The customer support centre brings together operations, technology and market surveillance staff in a single location, which is now ASX's primary operations base. The current customer support centre was previously ASX's secondary operations site for business continuity purposes.

Consistent with both the Agile approach to project delivery and the close relationship between operations and technology reflected in a recent restructuring of the Operations division, the design of the centre supports the colocation of, and collaboration between, staff with interdependent functions, both on a business-as-usual basis and in project delivery.

Following the opening of the centre, ASX established a new Customer Experience team under a new Executive General Manager. This team brings together the main customer-facing functions from across ASX and is responsible for the development and delivery of the ASX customer experience.

Alongside these changes to broader customer support arrangements, ASX introduced changes to the organisation of its Operations division in June. Most notable was the creation of a new Risk Manager, Operations position, reporting directly to the Group Executive, Operations; the new Risk Manager will have responsibility for matters such as business continuity, incident reporting and management, and will work closely with the General Manager responsible for enterprise-wide risk management. The new role is intended to enhance support for risk identification and management in operational processes.

Cyber resilience

The Bank noted in its 2013/14 Assessment the increasing focus, both internationally and domestically, on the cyber resilience practices of FMIs and other key participants in the financial system. For instance, a November 2014 CPMI report highlighted the highly disruptive impact that could result from an interruption to critical clearing and settlement services or a degradation of data integrity at an FMI. Given this potential for systemic impact, the Bank has continued a dialogue on cyber resilience matters during the 2014/15 Assessment period, in collaboration with ASIC. As part of this,

²⁵ The Australian Liquidity Centre provides market participants with the option to colocate their servers with ASX's data centre.

the Bank requested that ASX carry out a self-assessment against the United States National Institute of Standards and Technology (NIST) Cybersecurity Framework (Box B, below).

In parallel, CPMI has commenced joint work with IOSCO to develop guidance to assist in interpreting the requirements in the PFMIs as they apply to cyber-related risks. The Bank's engagement with ASX on cyber resilience issues has helped to inform its involvement in developing the CPMI-IOSCO guidance (as it did the previous CPMI report), which in turn is expected to form the basis of the Bank's ongoing supervision of ASX's cyber resilience framework.

ASX has provided valuable information on its cyber resilience approach via the high-level NIST self-assessment and supporting documentation. From the dialogue to date, the Bank intends to deepen discussion with ASX on two aspects of its cyber governance in particular.

- *Board-level governance of cyber risks.* Given the significance of cyber risks for ASX's ability to provide continuity and integrity of critical clearing and settlement services, Board-level governance of these risks is crucial.
- *Ongoing review of the Information Security Strategy and Policy Framework.* A formal periodic review process is a useful discipline to ensure senior management or Board-level visibility of the strategy and policy direction taken to manage cyber risks. This might include measurement of progress against key objectives and adaption of strategy and policy to an evolving threat landscape.

The Bank will continue its engagement, jointly with ASIC, with ASX on cyber resilience issues over the 2015/16 Assessment period. It is expected that the forthcoming CPMI-IOSCO guidance on cyber resilience will provide a basis for this engagement over the coming period.

Recommendation. ASX is encouraged to continue its dialogue with the Bank on its cyber risk management arrangements, including on the Board-level governance of its cyber risks and ongoing review of its information security strategy and policy framework. ASX is also encouraged to review its cyber risk management arrangements in light of forthcoming CPMI-IOSCO guidance on cyber resilience for FMIs.

Box B: Cyber Resilience

In the first half of 2015, ASX completed a high-level self-assessment of its cyber resilience practices against the United States NIST Cybersecurity Framework, which is used widely by critical infrastructure providers and other organisations in a number of jurisdictions internationally. Working with ASIC, the Bank has used the outcome of this self-assessment as the basis for a dialogue with ASX on cyber resilience, with a particular emphasis initially on cyber governance.

The NIST Framework

The NIST Framework seeks to provide a repeatable and risk-based methodology to help operators of critical infrastructure identify, assess and manage cyber risk. It does not prescribe specific controls but does reference commonly used cyber security standards that contain specific controls, including the ISO 27001 standard utilised by ASX in its management of technology risks. One benefit of the NIST Framework is that it establishes a common terminology to allow organisations to better communicate how they manage cyber risk to a non-technical audience, including an FMI's Board and senior

management. In addition, a number of overseas regulators are using or plan to use the NIST Framework as an input into their oversight of cyber-related risks for FMI.

The NIST Framework is organised according to five high-level cyber resilience functions, each broken into more granular categories and sub-categories. Sub-categories are each associated with particular cyber risk mitigants and accompanying references to specific controls.

- *Identify*. Developing the organisational understanding to manage cyber security risk to systems, assets, data and capabilities.
- *Protect*. Developing and implementing appropriate safeguards to ensure delivery of critical services.
- *Detect*. Developing and implementing appropriate activities to identify the occurrence of a cyber security event.
- *Respond*. Developing and implementing the appropriate means of responding to a cyber security event when detected.
- *Recover*. Maintaining plans for resilience and the restoration of any services impaired by a cyber security event.

ASX carried out a high-level self-assessment of its current cyber resilience practices in each of the categories and sub-categories associated with these five functions. This self-assessment concluded that ASX's cyber security practices generally aligned with the upper two tiers of maturity levels under the NIST Framework. The Bank, together with ASIC, used ASX's self-assessment as a basis for further discussion on various aspects of its cyber resilience framework, most notably its cyber governance.

Cyber governance

ASX's cyber resilience approach is managed at a group-wide level, reflecting that different business areas share common vulnerabilities to cyber threats and that the response to such threats may require group-wide coordination. Ultimate responsibility for the management of ASX's cyber-related risks therefore lies with the ASX Limited Board. In practice, however, the Board delegates its ongoing oversight of cyber resilience to the ASX Limited Audit and Risk Committee, subject to the Board's stated low tolerance for residual operational risks. The Board remains informed of significant cyber-related developments or issues, including where cyber incidents could threaten the availability or integrity of ASX systems, and in considering cyber risks in the approval of major projects. The Audit and Risk Committee receives regular updates on information security matters and oversees the cyber resilience activities of ASX management and staff through the existing enterprise risk management framework. The Board receives a report from the Audit and Risk Committee Chair on significant matters discussed at each meeting.

Internal governance of ASX's cyber resilience approach is carried out under a number of management and staff-level groupings, consistent with ASX's overarching Information Security Strategy (see 'Cyber resilience approach' below).

- *Security Steering Committee (SSC)*. The SSC is responsible for approving, implementing and overseeing ASX's information and physical security strategies, and coordinating ASX's security initiatives with management of its Technology division. It is chaired by the Information Technology (IT) Security Manager, and comprises: the Chief Information Officer (CIO); Chief Financial Officer; Group Executive, Operations; General Manager, Internal Audit; National Facilities Manager; General Manager, Technology Governance; and General Manager, Corporate Technology. The SSC provides reports to the Audit and Risk Committee and the executive-level

Enterprise Risk Management Committee through regular Technology status and enterprise risk reports, as well as ad hoc security reports.

- *CIO (IT Security Owner)*. The CIO (as IT Security Owner) has responsibility for executive-level oversight of ASX's cyber security approach. This includes initiating and approving the scope of external reviews of ASX's cyber resilience (in consultation with the IT Security Manager and Internal Audit).
- *IT Security Manager*. The IT Security Manager is responsible, with the IT Security Team, for executing the Information Security Strategy approved by the SSC. The IT Security Manager reports directly to the CIO, and can raise cyber resilience issues at an enterprise-wide level as Chair of the SSC and via regular cyber security updates to the Audit and Risk Committee.
- *IT Security Team*. The IT Security Team works under the IT security manager to carry out cyber-related support, testing and review, consistent with ASX's Information Security Strategy. The IT Security Team works closely with operational staff and project teams to ensure the integration of cyber controls into ongoing operations and new business initiatives.
- *IT Security Working Group*. The IT Security Working Group provides an additional layer of staff-level coordination on cyber security matters, including prioritisation of security tasks within guidelines set by the SSC and coordination of compliance reviews. It is chaired by the IT Security Manager and comprises other staff from the IT Security Team, as well as General Managers from Technology division and relevant project staff. The IT Security Working Group reports to the SSC.
- *Internal Audit*. ASX's Internal Audit department provides independent review of ASX's cyber resilience approach. ASX's internal audit plans for 2014/15 and 2015/16 cover several cyber-related topics, including an in-depth external expert review of ASX's security processes and controls against the Australian Signals Directorate (ASD) Strategies to Mitigate Targeted Cyber Intrusions.²⁶ Internal Audit reports to the Chief Executive Officer, Audit and Risk Committee and CS Boards, and is represented on the SSC.

In addition to the internal audit and review of ASX's cyber resilience practices, cyber-related controls for key systems are subject to annual external audit. External consultants are also engaged by ASX to provide targeted testing of ASX's cyber resilience, such as the vulnerability of ASX systems to external attack.

ASX engages in regular dialogue on cyber resilience matters and the exchange of threat intelligence with international peer exchange groups (including via the World Federation of Exchanges), and large domestic financial institutions and non-financial critical infrastructure providers.²⁷ This engagement provides ASX with valuable information regarding emerging cyber threats and enhancements to resilience practices among its peers. ASX also engages with the Bank on cyber resilience issues relevant to the link between Austraclear and the Reserve Bank Information and Transfer System (RITS).

Cyber resilience approach

ASX's cyber resilience approach is defined by the Information Security Strategy approved by the SSC, and more granular policies and standards set out in ASX's Information Security Policy Framework. The Information Security Strategy sets out six high-level objectives for ASX's information security approach:

26 The review will focus on the 'Top 4' strategies.

27 ASX's IT Security Manager chairs the World Federation of Exchanges' working group on cyber security issues.

- ensuring that information security supports enterprise-wide strategy and governance, safeguarding the confidentiality, integrity and availability of critical data and systems
- ensuring that information security is implemented using a risk-based approach
- ensuring that information security considers interdependencies with external stakeholders (including participants and regulators)
- supporting the development of a culture of security and the acceptance of information security responsibilities throughout the organisation
- ensuring information security is flexible enough to adjust to meet changing market demands
- pursuing continual improvement in the effective and efficient deployment of information security controls.

In executing its Information Security Strategy, ASX utilises relevant best practice standards, including the international standards ISO 17799 (which covers principles for information security management) and ISO 27001 (requirements for information security management systems), and the ASD top 35 strategies for mitigating cyber intrusions. The Information Security Strategy and Policy Framework are reviewed on a regular basis by the IT Security Team, with formal review by the SSC carried out on an ad hoc basis in response to material changes to the security environment.

ASX's cyber resilience approach, as defined by its Information Security Strategy and Policy Framework, spans each function of the NIST Framework. Some key elements of this approach are summarised below.

- *Identify.* ASX assigns a risk-based prioritisation to key systems, placing core clearing and settlement systems in the 'critical' category. The integration of ASX's cyber approach into the general organisation is described in the section on 'cyber governance' above.
- *Protect.* ASX applies a range of controls to protect its critical assets and systems from a cyber intrusion. These include training staff on good cyber practices, appropriate encryption of sensitive or confidential data, maintenance of firewalls to protect the network perimeter and access controls (managed by a newly created Identity and Access Management Team). ASX's system architecture is designed to minimise the risk of a cyber threat spreading, via the segregation of critical systems. Security assessments and reviews are integrated into the deployment of new or modified systems, while ASX enforces security standards and guidelines on its third-party vendors.
- *Detect.* ASX carries out continuous monitoring of its network for cyber intrusions and malicious code. Regular scans are also carried out to ensure that both the network perimeter and system assets remain secure.
- *Respond.* ASX maintains an IT Security Incident Response Procedure, which sets out a process and time frames for escalating cyber incidents to the IT Security Manager and the CIO. The Procedure also sets out processes for containment and eradication of the threat, as well as post-incident review to determine root causes and prevent recurrence.
- *Recover.* The IT Security Response Procedure also sets out actions that may be required to recover from a cyber incident, including restoration of systems and data from an uncorrupted backup source. ASX also maintains detailed business continuity plans that target the recovery of systems within two hours from an identified interruption to availability. However, while these

plans are intended to apply to both physical and cyber threats to business continuity, the unpredictable nature of cyber threats may mean that recovery within the targeted time frame is not achievable in all cases.

T+2 settlement

ASX has continued to progress planning for the transition to a two-day (T+2) settlement cycle for cash equities from the current three-day cycle. This was identified as a key priority by the Forum in 2013/14 (see Section 3.5.2), and mirrors similar moves underway in a number of jurisdictions internationally. Having received widespread industry support for this initiative, ASX is targeting an implementation date in March 2016.

As part of these changes, ASX will be extending the cut-off time for submitting instructions to the daily settlement batch from 10.30 am to 11.30 am. This is intended to mitigate the potential impact of a shortened cycle on participant arrangements to process and pre-position securities for settlement. The extension will, however, reduce the time available to complete payment authorisations and address any problems or delays to settlement. Specifically, the time available to ASX to address any implications for batch settlement arising from a participant payment default would be reduced to 90 minutes (from two hours).

ASX continues to engage with market participants to help ensure that the industry will be ready for the transition to the shorter settlement cycle. As part of this, ASX established a Market Implementation Group to facilitate the exchange of information on implementation progress and issues, which is open to all market participants, system vendors and other interested parties. ASX has also hosted a number of workshops with industry bodies (including the Australian Custodial Services Association, the Australian Securities Lending Association, and the Stockbrokers Association of Australia), participants and their system vendors to discuss the relevant business and technical requirements.

One issue raised during initial industry consultations was the importance of aligning the cash equities settlement cycle with that of other linked instruments that are currently settled on a three-day cycle. In light of this issue, ASX has continued to engage with issuers of exchange-traded funds to ensure they will be ready for the transition. ASX also engaged with the Australian Financial Markets Authority (AFMA) on adjusting the settlement conventions for wholesale debt securities to T+2 (including Australian Government Bonds that are also traded on ASX). AFMA has received support from the industry to proceed with this initiative in line with the changes in the cash equities market. NZX has announced its intention to move to a T+2 settlement cycle in March 2016, in alignment with Australia.

Payment providers

A number of developments in the cash equities market over recent years have required supporting changes to the processes of Payment Providers, the agents that ASX participants use to effect cash movements that support securities settlement. In light of the dependence on Payment Providers in implementing changes to settlement processes, the Bank's 2013/14 Assessment recommended that ASX Clear and ASX Settlement introduce a framework to formally engage Payment Providers on such changes. ASX worked with the Australian Payments Clearing Association (APCA) to establish such a framework during the Assessment period. This took the form of an APCA standing sub-committee comprising representatives of the Payment Providers, with ASX acting as an 'observer'. The role of the committee is to consider and provide feedback on proposed amendments to the agreement that governs arrangements with Payment Providers, facilitate consultation with Payment Providers, and

ensure that Payment Providers are notified of any upcoming developments. The first meeting of the sub-committee was held on 26 August 2015. The Bank will monitor ASX's interaction with the sub-committee as a formal means of engagement on changes to settlement processes in response to regulatory or market-driven change.

Changes to settlement arrangements

During the Assessment period ASX made two minor changes to the exercise and settlement arrangements for equity derivatives.

- In November 2014, ASX Clear implemented changes to mitigate potential principal risk around the LEPO expiry settlement process.²⁸ Under the new arrangements, settlement of the underlying and all outstanding cash flows occurs simultaneously in the CHES batch. Previously, only the strike was settled in this way, with the balance of the premium (the majority of the cash flow) settling earlier in the day via Austraclear. The changes provide a long-term solution to address the potential principal risk to ASX Clear that could arise from settling the balance of the premium separately from the underlying securities. This risk was previously mitigated by withholding outgoing payments to participants until the linked securities had settled within the batch.
- In February 2015, ASX Clear introduced automatic exercise on expiry as the default setting for all in-the-money cash settled and deliverable options. The change is intended to eliminate the operational risk that a participant inadvertently fails to set up automatic exercise as the default for an account or inadvertently fails to exercise an in-the-money position.²⁹ Under the new arrangements, participants remain able to exclude specific positions from being automatically exercised; ASX is also considering further changes which would allow participants to set minimum thresholds to exclude the exercise of fractionally in-the-money positions.

Oversight of critical service providers

In December 2014, CPMI and IOSCO published a finalised Assessment Methodology for the oversight expectations applicable to organisations providing critical services to FMIs.³⁰ The Assessment Methodology provides a framework for considering how to apply the oversight expectations for critical service providers set out in Annex F of the PFMIs and the Bank's guidance to CCP Standard 16.9. The Bank will discuss with ASX how it applies these oversight expectations in managing its relationships with external providers of critical services, including the role of the CPMI-IOSCO Assessment Methodology in its oversight of these critical service providers.

3.5.7 Participation and access

There were a number of developments during the Assessment period in relation to participation requirements and access.

- **Tiered participation requirements.** To demonstrate their ongoing capacity to meet their financial obligations, clearing participants in ASX Clear are required to maintain minimum levels of 'core

28 Only a small proportion of the option premium on a LEPO is paid upfront, and both buyer and seller pay margins throughout the life of the LEPO. Upon exercise at expiry, the buyer pays the final margin payments, the balance of the premium and strike price to the seller in exchange for the securities.

29 Previously, participants were required to manually initiate and manage their exercise preferences upon expiry.

30 See CPMI-IOSCO (2014), *Principles for Financial Market Infrastructures: Assessment methodology for the oversight expectations applicable to critical service providers*, December, available at <<http://www.bis.org/cpmi/publ/d123.htm>>.

capital'.³¹ In August 2014, following consultation with participants, ASX introduced tiered core capital requirements for participants that offer third-party clearing services (General Participants). Previously, all General Participants were required to maintain a minimum of \$20 million in core capital. Under the new arrangements, a General Participant must maintain \$5 million in core capital for each trading participant (including itself) for which it clears, up to \$20 million (See Section 3.3.1).

- **Remote clearing.** In April 2015, ASX Clear (Futures) commenced a pilot scheme for the admission of participants that are incorporated and base their operations offshore. The first participant admitted under the scheme is a futures-only participant based in the UK. ASX Clear (Futures) is considering whether to extend the scheme more broadly at the conclusion of the pilot program. Any extension would be limited to a narrow range of jurisdictions with a regulatory and legal framework deemed to be comparable to that in Australia. Participants clearing from offshore would be required to demonstrate that no conflicts of law would arise as a result of their participation.
- **Amendments to admission and notification requirements.** In June 2015, ASX made a series of changes to its Rules and Procedures in order to streamline and standardise the admission and notification requirements for the ASX and ASX24 markets, as well as the clearing and settlement facilities that serve them. The changes largely involved aligning the requirements for participants across the facilities to produce a more uniform regime, and the removal of duplicated requirements. As part of this process, ASX provided additional guidance to participants on: the admission process and criteria; notification obligations; offshoring and outsourcing arrangements; and business continuity requirements.

3.5.8 Disclosure

ASX is required to provide comprehensive and detailed disclosures demonstrating how its CS facilities' governance, operations and risk management frameworks meet the requirements of the Principles, in accordance with the Disclosure Framework set out in the CPMI-IOSCO *Principles for Financial Market Infrastructures: Disclosure framework and assessment methodology*.³² In April 2015, ASX made significant enhancements to its published disclosure document, to provide greater detail as to how its CS facilities meet the Principles and corresponding FSS, and to present this information in a way that is more useful for participants. ASX plans to update this document at least annually and further enhance its disclosure as necessary from time to time.

ASX currently reports basic risk and activity data for the CS facilities via a monthly activity report, as well as through additional data published on both its main website and dedicated website on clearing and settlement of cash equities. In February 2015, CPMI and IOSCO published a finalised set of quantitative disclosure standards for CCPs that are intended to complement descriptive disclosures under the Disclosure Framework.³³ The ASX CCPs plan to publish an expanded set of quantitative risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards. The initial set

31 'Core capital' is defined by ASX to be the sum of: all paid-up ordinary share capital; all non-cumulative preference shares; all reserves, excluding revaluation reserves; and opening retained profits/losses, adjusted for current year movements.

32 The CPMI-IOSCO *Principles for Financial Market Infrastructures: Disclosure framework and assessment methodology* is available at <<http://www.bis.org/publ/cpss106.htm>>.

33 The CPMI-IOSCO *Public Quantitative Disclosure Standards for Central Counterparties* is available at <<http://www.bis.org/cpmi/publ/d125.pdf>>.

of data is planned for publication in December 2015. The Bank has advised that it expects ASX to transition to the new requirements on the timeframe envisaged by CPMI and IOSCO. The Bank will continue to monitor steps by ASX to refine and enhance its disclosure.

Recommendation. In order to continue to observe CCP Standard 20, ASX Clear and ASX Clear (Futures) should carry out plans to regularly publish risk and activity data in accordance with the CPMI-IOSCO quantitative disclosure standards for CCPs.

3.6 Cross-border Recognition

Under the *European Regulation on OTC derivatives, central counterparties and trade repositories* (EMIR), non-EU CCPs that provide clearing services to participants established in the EU must obtain recognition from the European Securities and Markets Authority (ESMA). Since three of ASX Clear (Futures)' participants are branches of European headquartered banks, ASX Clear (Futures) applied to ESMA for recognition in September 2013. Under EU banking regulation, favourable capital treatment for the exposures of European headquartered banks (including exposures via Australian subsidiaries) is restricted to CCPs recognised by ESMA. Since several participants in ASX Clear are subsidiaries of European banks, ASX Clear also applied to ESMA for recognition in 2014.

As a prerequisite to recognition of the ASX CCPs, ESMA had advised the European Commission in late 2013 that it considered Australia's regulation of CCPs to be equivalent to that in the EU under EMIR. While both EMIR and the Bank's FSS are based on common international standards, the PFMI, the EU requirements are drafted at a more detailed level. Accordingly, the Bank issued supplementary interpretation of a subset of standards to provide additional clarity in some areas. Initially, the supplementary interpretation was issued to apply only to derivatives CCPs operating in Australia, since only ASX Clear (Futures) was seeking recognition in Europe. In October 2014, however, the supplementary interpretation was amended to apply more broadly to all domestically licensed CCPs that provide services to clearing members that are either established in the EU or subject to EU bank capital regulation (see 'Supplementary Interpretation of the CCP Standards' in Appendix A).³⁴ This broader application of the supplementary interpretation enabled ASX Clear to also seek recognition under EMIR. In accordance with the supplementary interpretation, ASX Clear made some changes to its risk management arrangements – most notably, sourcing an additional \$100 million via a committed liquidity facility and establishing a participant risk consultative committee (see Sections 3.5.1 and 3.5.2).

Also in October, the European Commission adopted an Implementing Act to give effect to the positive regulatory equivalence decision reached by ESMA in 2013. This was followed, in late November, by the conclusion of a Memorandum of Understanding between the Bank, ASIC and ESMA to govern information sharing and cooperation between the signatory authorities in respect of any Australian CCPs recognised under EMIR. With these pre-conditions having been met, and ESMA having considered detailed applications by both ASX Clear (Futures) and ASX Clear, ESMA announced on 29 April that both CCPs had been recognised as third-country CCPs under EMIR.

Separately, on 18 August 2015 ASX Clear (Futures) was granted an exemption from registration as a DCO in the US. The exemption allows ASX Clear (Futures) to continue providing OTC IRD clearing services to US-based participants without the need to submit to the full range of regulatory

³⁴ The Bank's supplementary interpretation of the FSS is available at <<http://www.rba.gov.au/payments-system/clearing-settlement/pdf/supplementary-guidance-domestic-derivatives-ccps.pdf>>.

requirements applicable to DCOs under US law. The CFTC's decision to grant an exemption to ASX Clear (Futures) followed its previous extension of time-limited no-action relief from the requirement to register as a DCO, initially until the end of 2014. This was ultimately extended to end 2015, subject to ASX undertaking to submit a petition for permanent exemption from registration as a DCO by June 2015. As part of this process, ASX was asked to demonstrate that it was subject to comparable and comprehensive supervision and regulation by its home country regulators (the Bank and ASIC), and that it observed in all material respects the PFMI. ASX duly submitted its petition on 1 June 2015, and was granted an exemption by the CFTC following a period of public consultation.

4. The Default of BBY Limited

On 18 May 2015, ASX was advised that a broker participant of ASX Clear, BBY, had entered into voluntary administration, activating ASX Clear's default management processes. This followed two weeks of action by ASX to manage down BBY's clearing business after BBY had missed a deadline for a CBPL-related AIM call. ASX managed BBY's default through a combination of client transfers and the close out of remaining positions. Overall, the close out proceeded without any evident market impact and all losses arising in the close-out process were sufficiently covered by margin held.

The default management process nevertheless highlighted several matters relevant to ASX's risk management and default management arrangements that are worthy of further consideration. The Bank encourages ASX to complete its review of experience gained from the BBY default, and to enhance its risk management and default management arrangements as appropriate.

4.1 Background

The first early warning of potential governance, control and financial issues at BBY occurred in June 2014. At that time, BBY submitted for clearing an unusually large concentrated cash market transaction, which ultimately caused it to breach its CBPL. The CBPL limits the size of positions relative to capital that a participant is able to clear; a participant that breaches this limit is required to post additional collateral. BBY did not have sufficient funds available to meet the CBPL-related AIM call. ASX permitted a delayed payment, but subsequently imposed restrictions on BBY's admission as an ASX Clear participant. ASX also proceeded to engage with BBY on the adequacy of its governance framework and risk control systems.

ASX undertook a range of compliance and enforcement actions to sanction BBY throughout 2014/15. In the context of this ongoing enforcement action, ASX identified errors in BBY's capital returns. The correction of these errors resulted in a downward restatement of BBY's capital adequacy which triggered another CBPL breach on 6 May 2015.

BBY was unable to meet the CBPL AIM call by the scheduled time. ASX permitted a delayed payment instead of calling an event of default. ASX's Default Management Committee (DMC) determined that ASX should work with BBY to achieve an orderly exit from its derivatives clearing business. This decision was conditional upon BBY's banker continuing to support BBY during the wind down. It also reflected prevailing market conditions and ASX's judgement that the CCP was adequately covered against potential credit exposures to BBY during this period.

BBY accordingly committed to a wind-down plan which involved a combination of closure and transfer of derivatives client positions. Arrangements were made such that on a daily basis ASX would be provided with a solvency statement from BBY's directors and a statement of ongoing financial support from BBY's bankers. Should an unsatisfactory report have been received, ASX was ready to declare a default and commence default management processes. ASX also continuously monitored that the collateral held from BBY would be sufficient to cover the ongoing wind-down process.

However, late on 17 May BBY entered voluntary administration. Having been notified of this early on 18 May, ASX consequently declared a default and initiated its default management processes.

4.2 Default Management Process

At the time of the missed margin call on 6 May, BBY had more than 1 000 derivatives clients, which together accounted for around 10 per cent of ASX Clear's derivatives exposures (as measured by total margin requirements). Under the agreed wind-down plan, BBY had closed out or transferred client positions representing around a third of its derivatives exposures by the time it entered voluntary administration.

ASX's strategy for managing the remaining options positions involved three measures:

- Where arrangements to transfer client positions to another clearing participant were sufficiently well advanced as part of the ongoing wind-down plan, these transfers would proceed.
- Out-of-the-money equity index options expiring on 21 May would be carried through to expiry.
- Remaining positions, including positions unable to be transferred within three days, would be closed out.

Ultimately, over half of the outstanding derivatives exposures were able to be ported. The remaining open positions were closed out by ASX within five days, with around 90 per cent of these exposures closed out by the end of Thursday 21 May. All close-out costs were sufficiently covered by margin held by ASX Clear. Nevertheless, ASX utilised a limited amount of excess client collateral (a large portion of which comprised securities lodged as 'specific cover'),³⁵ and two clients did not have sufficient margin or excess collateral to cover small losses on their accounts.³⁶

ASX had originally intended to carry BBY's unsettled cash equity positions through to settlement. However, BBY's administrators did not consent to this strategy and ASX therefore proceeded to close out these positions. All cash equity positions were closed out by the end of Wednesday 20 May, with the exception of positions in stocks that were either suspended or subject to a trading halt. All costs from the close-out process were well within the level of cash market margin held by ASX Clear.

4.3 Experiences Gained

ASX was ultimately able to manage the default without any evident market impact and with all close-out losses sufficiently covered by margin held. Accordingly, the experience of the BBY default has not altered the Bank's assessment that ASX's risk management and default management arrangements observe the relevant minimum standards under the FSS. Nevertheless, the default management process highlighted several areas in which ASX could consider making further enhancements to its risk management and default management arrangements in the spirit of continuous improvement.

35 Margin obligations may be met by posting either cash or non-cash collateral, including stocks lodged as 'specific cover' for call options written on the same stock. Excess collateral is collateral lodged by clients in excess of their margin requirements.

36 Client collateral posted against derivatives positions cannot be used to offset losses arising from the participant's house account or another client account. The shortfall on these client accounts was covered by the AIM lodged by BBY in respect of its CBPL breach.

Model parameters

The costs incurred by ASX Clear in managing the event of default were covered by collateral held by the CCP, the most significant component of which related to BBY's margin requirements. This suggests that overall margin settings were adequate, at least for the observed level of price moves. However, a number of individual model assumptions were not validated in the default management process. In light of this, the Bank encourages ASX Clear to consider the experience gained from BBY's default as part of its broader review of the calibration of its margin model parameters (see Section 3.5.1).

The risk profile of individual client accounts

Overall, ASX Clear held sufficient collateral from BBY to absorb all losses arising in the close-out process. However, the risk profile of individual clients raised some matters that may be worthy of further consideration by ASX.

Where client accounts are segregated on an individual basis, as is the case for derivatives cleared by ASX Clear, only margin allocated to a particular individual account can be used to absorb losses on that account. Any shortfall in margin coverage on an individual client account must be met by house collateral posted by the participant or, failing that, ASX Clear's pooled financial resources.³⁷ In the case of BBY, there was sufficient collateral in individual client accounts to meet losses on the close out of those accounts in all but very few cases. Where there was insufficient collateral, realised shortfalls were very small and the house margin held by BBY to support cash equity exposures and additional margin called in respect of the CBPL breach provided an ample buffer.

However, the experience highlighted the risk that in the absence of such a 'buffer' – for instance, if a participant had limited cash equity clearing activity, or had not been subject to a call for additional margin – even a small shortfall on an individual client account would have to be met by a draw on ASX Clear's pooled prefunded financial resources. In the case of a default fund comprised of participant contributions, the defaulted participant's contribution would be drawn down first. However, in the case of a fund comprised entirely of the CCP's own capital, as is the case for ASX Clear, this additional 'defaulter-pays' protection is not available.

To the extent that correlation assumptions (and hence offsets) across derivative products in ASX Clear's margin models are conservative, diversification within each individual client account provides a layer of protection for ASX. However, portfolios with highly directional or concentrated positions do not benefit from the same degree of additional protection.

There may be a case, therefore, to consider additional safeguards to provide a buffer between margin held to support individual client accounts and prefunded pooled resources to deal with circumstances where a lack of diversification could remove the benefits of conservative margin offsets. Such safeguards could, for instance, include 'add-on' margin requirements for highly directional or concentrated exposures.

Participation requirements and tiered participation

ASX Clear's participation requirements are designed to promote the safety and integrity of the CCP. They cover minimum capital and financial obligations, as well as governance, operational and risk management standards. ASX has wide-ranging powers to monitor and enforce compliance with these requirements.

³⁷ House collateral includes collateral posted in respect of cash market margin requirements, which are commingled between house and client positions.

The BBY default has highlighted, however, that the observed variations in the scale and nature of activity across the range of ASX Clear participants may justify a more risk-sensitive approach to determining minimum capital requirements for participants. While participants are already required to meet a risk-based core capital requirement, there may be a case for determining minimum capital and liquidity requirements with reference to a broader range of factors related to a participant's risk profile, including the nature and extent of their client clearing activity.

Relatedly, the incident drew attention to potential dependencies arising from tiered participation. Efforts to identify suitable transferee participants for client positions following the default highlighted the lack of depth in indirect clearing arrangements for the ETO market. A wider distribution of retail clearing participants could reduce concentration risks for ASX Clear. In light of this, ASX intends to examine impediments to new entry in the ETO retail client clearing market, and has already been considering various options for more flexible participant structures with several of its user forums, including the Business Committee and the ETO Advisory Committee.

Portability

The availability of individually segregated derivatives client accounts at ASX Clear supports the portability of client positions and collateral in the event of a clearing participant default, since this ensures that client accounts can be transferred on a fully collateralised basis. In managing the BBY default, ASX Clear was able to complete the transfer of client accounts that together represented the majority of open positions.

It was always recognised that even with individually segregated client accounts, portability could be challenging. The BBY incident highlighted a number of specific impediments. In particular, portability relies on the willingness, and capacity, of another participant to take on the affected clients within a short period of time. The BBY default demonstrated that porting may not be possible if transfer arrangements had not already been pre-positioned prior to the clearing participant's default, due to the time required for receiving participants to complete due diligence and 'know-your-customer' processes. ASX has begun to consider how account structures and transfer arrangements could be enhanced to facilitate the efficient porting of clients in an event of default. This includes examining ways to improve the operational efficiency of the portability process and encouraging a wider distribution of retail clearing participants that could potentially accept transferee clients (see above).

4.4 Recommendation

The default of BBY highlighted several matters relevant to ASX's risk management and default management arrangements. The Bank has begun to discuss some of the experiences gained from this incident with ASX and will continue to do so over the coming Assessment period. The Bank encourages ASX to complete its review of experience gained from the BBY Limited default, and to enhance its risk management and default management arrangements as appropriate.

5. Special Topic – Stress Testing

A CCP relies on its financial resources to absorb potential losses stemming from participant default, and thereby support its core counterparty risk management function. A CCP conducts regular stress tests to verify the sufficiency of its financial resources in extreme (but plausible) market conditions.

The importance of stress testing to the resilience of CCPs has received increasing attention internationally among both regulators and CCP participants. Domestically, the Bank recommended a full external expert validation of ASX’s capital and liquidity stress test models as part of its 2013/14 Assessment of the ASX CCPs. The resulting validation reports have contributed to changes in ASX’s stress-testing approach. Further enhancements are expected, including in response to international policy developments in this area.

This section describes ASX’s stress-testing framework, and assesses it in light of existing requirements under the FSS and the anticipated direction of the international work. ASX is found to have observed all relevant requirements of the FSS. The Bank has nevertheless identified a number of areas in which ASX could usefully enhance its stress-testing approach in the spirit of continuous improvement, consistent with ASX plans to implement further refinements in future phases of its stress-testing enhancement programme.

5.1 FSS Requirements

The FSS requirements that relate to stress testing are contained within CCP Standard 4 for credit risk (set out in Table 13). These requirements cover four main areas:

- *Governance and process.* Governance arrangements should define the objectives of stress testing and clarify the allocation of responsibilities for stress testing. The ASX CCPs are required to use stress testing to ensure that their prefunded financial resources are sufficient to cover obligations that could arise in the event of the joint default of any two participants and their affiliates (Cover 2) in ‘extreme but plausible’ market conditions (CCP Standard 4.4).³⁸ Stress tests must be carried out daily.
- *Modelling extreme but plausible scenarios.* Stress testing should employ a wide range of scenarios that take into account material sources of risk in a variety of extreme but plausible market conditions. These should include historically observed peak market movements as well as forward-looking scenarios, and take into account changes in market conditions, such as correlations between products, market liquidity and concentration, as well as interdependencies in the default management process (CCP Standard 4.6).
- *Use of stress-test outcomes.* CCPs should have an effective means of increasing financial resources where stress-test losses indicate a shortfall. This could involve an increase in margin or pooled

38 The Bank has issued a supplementary interpretation of CCP Standard 4.4, which confirms that the ASX CCPs are considered to be ‘systemically important in multiple jurisdictions’ and therefore required to size their financial resources to a Cover 2 standard (see Section 3.6).

financial resources, depending on the frequency and dispersion of such projected stress-test losses (CCP Standard 4.7).

- *Review and validation.* CCPs should review stress-test scenarios and assumptions each month to ensure that they remain appropriate given changing market conditions (CCP Standard 4.5). CCPs should also carry out 'reverse' stress testing to identify extreme scenarios in which total financial resources would not be sufficient to cover tail risk (CCP Standard 4.6). In addition, a CCP should carry out a full annual validation of its stress-test model (CCP Standard 4.5).

5.2 CPMI-IOSCO Work

Enhancements to ASX's stress-testing approach are being undertaken in the context of wider international efforts to improve the transparency and consistency of stress-testing approaches across CCPs (see Section 3.5.1, Box A). Some large international clearing participants, as well as some regulators, have expressed concerns that stress-testing frameworks of many CCPs globally are not sufficiently transparent and that differing approaches across CCPs inhibit comparisons of resilience. There is also a concern that the relatively high-level requirements set out in the PFMLs may not provide sufficient guidance to promote a consistent approach to stress testing.

In response, CPMI and IOSCO have commenced work to evaluate current stress-testing practices of CCPs, and consider the case for additional guidance to promote consistency and comparability. The first phase of the CPMI-IOSCO work involves a stocktake of current stress-testing practices across CCPs based in a wide variety of jurisdictions. The case for developing standardised supervisory stress tests will be considered as part of the CPMI-IOSCO process.

5.3 Stress Testing in the ASX Risk Management Framework

ASX Clear and ASX Clear (Futures) use stress testing to determine the appropriate size of their respective default funds and to calculate requirements for AIM, which is typically called to cover large, concentrated exposures to individual participants. In this way, stress testing builds on initial margin requirements placed on participants, which are modelled according to estimates of the CCPs' potential future exposure to participants under normal market volatility.³⁹

The focus of this section is on ASX's capital stress tests, which seek to estimate on a Cover 2 basis the maximum credit exposure that the ASX CCPs could face. The capital stress tests operate by applying a range of extreme but plausible price and volatility shocks to underlying risk factors, which in turn affect the value of positions held by participants each day. These shocks are reflected in a set of scenarios that are applied to portfolios for each participant, generating potential Cover 2 losses in excess of initial margin for each CCP.⁴⁰ The ASX CCPs conduct daily capital stress tests in order to ensure that prefunded financial resources are sufficient to meet Cover 2 requirements. These prefunded resources include margin posted by participants and pooled financial resources held in

39 ASX models initial margin requirements to cover 99.7 per cent of the distribution of potential future exposure to participants (see Appendices A1.1 and A1.2, CCP Standards 6.1 and 6.3 for more detail on initial margin requirements in the ASX CCPs).

40 Further detail on the construction of stress-test scenarios is provided in the discussion of enhancements to ASX's stress-testing framework below (see also Appendices A1.1 and A1.2, CCP Standards 4.4–4.7).

each CCP's default fund.⁴¹ ASX Clear currently holds \$250 million of pooled prefunded financial resources, while ASX Clear (Futures) holds \$650 million.⁴²

Where stress tests indicated persistent and widespread breaches of financial cover on a Cover 2 basis, ASX would consider an increase in pooled financial resources. Similarly, stress tests that indicated exposures were persistently below the current level of financial resources could be used to support a reduction in the size of the default fund. The ASX CCPs typically maintain a buffer of pooled financial resources in excess of stressed exposures to minimise the need for frequent adjustments. In late 2013 and early 2014, however, ASX Clear (Futures) significantly increased its level of pooled financial resources in line with stress-testing outcomes when transitioning from Cover 1 to Cover 2 (Graph 11). This increase in resources was also in anticipation of higher exposures from the launch of its OTC derivatives clearing service.



Individual participants with potential stress losses that exceed a predetermined STEL are required to post AIM. Participants' STELs are largely determined by ASX's ICRs assigned to each participant, with the highest-rated participants' assigned limits equal to half of the CCP's prefunded resources.⁴³ This incentivises participants to manage the risk they bring to the CCP, since those with very large stressed exposures are required to cover these exposures on a 'defaulter pays' basis via AIM. Graph 11 illustrates the use of AIM by ASX Clear (Futures) to manage stress-testing results in excess of prefunded financial cover by individual participants; the adjusted Cover 1 and Cover 2 data take into account the additional cover provided by AIM, which is particularly prominent in the first half of 2015.

41 Historically, both CCPs calculated their prefunded financial resources on a Cover 1 basis (i.e. assuming a single default only), but moved to doing so on a Cover 2 basis in light of the Bank's supplementary interpretation of the FSS. This supplementary interpretation was issued in the context of the CCPs' applications for recognition in the EU (see Section 3.6). In the case of ASX Clear (Futures), the transition to Cover 2 took place in September 2013. ASX Clear, by contrast, decided more recently to seek recognition in the EU and began conducting its stress tests on a Cover 2 basis only from 31 March 2015. This has not required an increase in ASX Clear's prefunded financial resources.

42 Pooled financial resources are invested at the parent entity level by ASX Clearing Corporation Ltd.

43 For more information on ASX's ICRs and AIM, see Appendices A1.1 and A1.2, CCP Standards 4.2 and 4.7.

While the sizing of the default fund and AIM calls are based on stress tests utilising a wide range of scenarios, ASX also maintains a range of ‘for-information’ scenarios that are not directly used for these purposes. For-information scenarios are used by ASX management to support broader analysis of the sufficiency of the CCPs’ financial cover. These scenarios may include some that are considered ‘beyond plausible’, or that are focused on potential future, or emerging, risks. As market conditions evolve, some of these for-information scenarios may be rotated into the set of scenarios used for AIM and default fund sizing.

Both CCPs also perform daily liquidity stress tests to ensure the adequacy of their liquidity arrangements. These liquidity stress tests determine the maximum level of liquid funds that each CCP would need to access in order to meet its obligations on time in the event of the default of the two largest participants and their affiliates. While the liquidity stress tests are closely related to the capital stress tests, there are some differences arising from the expected timing of payments. These are of particular significance in the settlement of securities transactions cleared by ASX Clear. ASX’s liquidity stress-testing framework underwent an independent external validation in early 2015 (see Section 3.5.1).

5.3.1 Review and validation

In order to ensure that stress tests remain appropriate, ASX has begun reviewing its set of stress scenarios on a monthly basis by using forward-looking and current market indicators. Recommendations for change are submitted to the CCP Boards for approval as required or as part of a comprehensive annual review of the stress tests at Board level. In addition, ASX performs monthly reverse stress tests to provide management with further information and to test model assumptions. These reverse stress tests examine the effect of varying the magnitude and direction of both shocks and participant positions, as well as the number of participant defaults assumed. The aim is to identify scenarios in which the CCPs’ financial resources would be exhausted. The scenarios identified as a result of this process assist management in determining whether existing stress-test scenarios adequately capture the range of extreme but plausible risks to the CCPs’ financial resources.

The internal review of stress tests is supplemented by an annual external validation, the first of which was carried out by an external independent expert in late 2014. The findings of this first validation and enhancements to ASX’s stress-testing approach in response are the primary focus of Section 5.4.

5.4 Enhanced ASX Stress-testing Framework

ASX is currently implementing a number of enhancements to its capital stress-testing approach, partly motivated by recommendations from the external validation of the capital stress-testing models. As part of this validation, ASX’s stress-testing processes and assumptions were benchmarked against those of a range of prominent CCPs based in Asia, Europe and the United States.

ASX’s approach was found to be broadly comparable to that of its peers, but a number of enhancements were recommended to bring ASX closer into line with international best practice as identified by the benchmarking study. The recommendations focus on ASX’s approach to constructing its stress-testing scenarios, given the key role these play in driving estimates of stressed exposures. Table 10 summarises ASX’s responses to these recommendations. These are discussed in more detail in the remainder of this Section.

ASX is implementing its proposed enhancements in two phases, the first of which came into effect in July 2015. The second phase of enhancements will be partly dependent on the outcomes of the CPMI-

IOSCO work on stress testing as well as enhancements to ASX’s statistical models and risk systems. While the timing for completion of this second phase is uncertain, work on implementation is currently underway.

Table 10: ASX’s Enhanced Stress-testing Framework

Element of stress-testing approach	ASX’s approach
Selection of risk factors	Additional risk factors in ASX Clear (Futures) expand coverage to 98 per cent of open positions
Treatment of house/client positions	Expanded sector-specific scenarios to cover all industry sectors, in addition to market-wide shocks Retain the current assumption that the 50 per cent (by number) of loss-making individual exchange-traded derivatives client accounts with the smallest losses would be transferred to another participant or closed out with a profit Losses on client positions in commingled omnibus accounts assumed to be realised Gains on client positions cannot be applied to offset losses on house positions
Confidence level and holding period	Reduction in the confidence level from once in 30 years to once in 20 years Increase the holding period from one day to three days for exchange-traded products; holding period for OTC products remains at five days
Scenario selection and methodology	Historically driven scenarios selected from actual or simulated distributions based on the desired confidence level and holding period Construction of historically driven scenarios based on: <ul style="list-style-type: none"> • single risk factors using actual distribution of price/volatility moves • multiple risk factors using a simulated joint distribution of price moves • stressed historical asset correlation ranges Expanded use of historical event-based scenarios for information to supplement scenarios drawn from actual or simulated distributions ASX Clear plans to introduce new scenarios stressing correlations between different individual sectors and the broader market ASX Clear (Futures) proposes to perform sensitivity analysis regarding the assumed combinations of co-movements along the yield curve Introduction of forward-looking scenarios based on assumed macro- or market-driven events Mixture of active and ‘for-information’ scenarios
Reverse stress testing	Monthly reverse stress testing of key assumptions: number of defaulting participants; magnitude of shocks; size and direction of positions Proposed refinements to reverse stress testing of correlations between sectors in ASX Clear

Source: ASX

5.4.1 Selection of risk factors

Stress-test scenarios may be designed to apply shocks to the full range of risk factors that could influence losses by a CCP in the event of a default, or they may apply shocks to only a subset of risk factors based on materiality considerations.

ASX Clear (Futures) previously applied shocks to risk factors underlying the four main futures contracts (equity index futures, 3- and 10-year government bond futures and 90-day bank bill futures), together with exposures on OTC IRD referencing the BBSW and Australian overnight index average (AONIA), covering around 90 per cent of open positions at the CCP. ASX is extending coverage to the next largest (and only other AUD) interest rate futures contract (the 30-day interbank cash

futures contract) as well as electricity contracts, taking stress-test coverage in ASX Clear (Futures) to around 98 per cent of open positions. ASX has concluded that other risk factors in ASX Clear (Futures) (such as those related to agricultural futures, or New Zealand dollar-denominated contracts) do not presently give rise to material exposures.

ASX has also extended its coverage of sector-specific equity shocks in ASX Clear; these now cover all 10 industry sectors in addition to market-wide risk factors.⁴⁴ ASX Clear's stress tests also include scenarios individually covering the 25 largest stocks by open derivatives positions.

5.4.2 House and client positions

In considering its total exposure to a defaulting participant, a CCP must consider the effects of the potential transfer of the accounts of that participant's clients to a non-defaulting participant. ASX makes the conservative assumption that client positions commingled in omnibus client accounts could not be transferred in a timely manner to another clearing participant in the event of a default, acknowledging that this would be extremely challenging to arrange in a short time frame. ASX therefore includes all stressed losses on omnibus client accounts in its stress-test outcomes.

For individually segregated client accounts on ASX Clear, ASX assumes that client accounts with sufficient margin to cover losses would be transferred (or closed out with profits that cannot be offset against other losses), along with the 50 per cent of remaining loss-making client accounts with the smallest losses. In practice, this means that almost the entire value (approximately 98 per cent) of any losses in excess of margin in segregated client accounts is assumed to be realised by the CCP.⁴⁵

In calculating the stressed losses at the level of each participant, ASX sums all stressed losses in excess of margin posted on client accounts that are assumed to be realised, and adds these to stressed losses on the participant's own proprietary ('house') positions. In doing so, ASX excludes any remaining margin in excess of estimated stressed losses on client accounts, since ASX would be required to return such margin to clients (via the external administrator of the defaulted participant) after completion of the close-out process. However, if there is an excess of margin over estimated stressed losses on house positions, ASX applies this to any net loss on client positions. The external validation of ASX's stress-testing models did not identify the need for any changes to ASX's treatment of house and client positions and collateral.

5.4.3 Confidence level and holding period

The calibration of stress-test scenarios depends on two key settings: the desired confidence level for financial resource cover; and the assumed period over which a CCP is exposed to losses ('holding period'). Previously, ASX calibrated its stress tests to a once-in-30 year event (covering 99.987 per cent of the estimated distribution of price movements), extending to once-in-100 years (or 99.996 per cent of price movements) for multi-asset scenarios in ASX Clear (Futures). A single-day holding period was applied for exchange-traded products, implicitly assuming that positions in these products

44 ASX Clear's capital stress test previously included sector-specific scenarios for consumer staples, energy, financials, health care, industrials, materials and telecom services; new scenarios have been added for the consumer discretionary, utilities and information technology sectors.

45 There is currently limited use of individually segregated client accounts on ASX Clear (Futures). ASX Clear (Futures)' estimate of stressed losses currently includes the two largest losses in excess of margin on individual client accounts at each of its participants; in practice this means that losses on all client accounts are assumed to be realised by the CCP.

inherited from a defaulting participant could be closed out in a single day, even in stressed market conditions.⁴⁶ In benchmarking, ASX was found to be generally more conservative than its international peers in setting the confidence level for stress tests, but found to apply a less conservative assumption in setting its holding period for exchange-traded products.

In response to these findings, ASX has extended its holding period for exchange-traded products to a minimum of three days, while reducing the targeted confidence level to a once-in-20-year event (or 99.980 per cent of the estimated distribution of price movements).⁴⁷ In order to assess the impact of these changes on stress-test outcomes, ASX has carried out backtests of the revised settings against positions held by its participants over the previous 12 months. This backtesting revealed little impact from the changes on the aggregate stress-test exposure in either CCP, measured on a Cover 2 basis, although there was some impact observed at the individual participant level in some cases. This is because, over the past 20 years, equity prices are observed to adjust more quickly to extreme shocks than interest rate futures prices,⁴⁸ and therefore each type of shock is relatively more sensitive to the changes in either confidence level (for equity price shocks) or holding period (for yield shocks). Table 11 presents a selection of the revised stress-test scenarios for exchange-traded products.

Table 11: A Sample of ASX’s New Stress-test Scenarios
Percentage change in price/yield

Scenario	Equities	Interest rate futures ^(a)			
		30-day	90-day	3-year	10-year
ASX Clear					
Market down	-14.3	-	-	-	-
Market up	9.8	-	-	-	-
ASX Clear (Futures)					
Equities down	-14.3	-	-	-	-
Equities up	9.8	-	-	-	-
Equities down, parallel down	-11.9	-11.4	-8.8	-9.1	-8.5
Equities down, parallel up	-9.4	12.2	10.9	10.2	9.7
Equities up, parallel down	7.7	-11.4	-11.8	-11.0	-10.4
Equities up, parallel up	10.3	12.2	10.5	10.6	10.3

(a) Interest rate futures contracts are over the 30-day interbank cash rate, 90-day bank bills, and 3-year and 10-year government bonds; shocks presented as percentage changes in yield
Source: ASX

In order to retain information to assist management in understanding the impact of more extreme scenarios, ASX intends to develop once-in-30- and once-in-40-year scenarios, as well as longer holding periods as part of the second phase of its stress-test enhancements. These scenarios will not directly feed into the sizing of financial resources or the calling of AIMs, but will be used by management in broader analysis of the sufficiency of the CCPs’ financial cover.

46 ASX applies a five-day holding period for OTC derivatives products, in line with its international peers, reflecting the longer default management and auction process required to close out positions in these less liquid products.

47 Scenarios involving shocks to the shape of the yield curve in ASX Clear (Futures) have not been updated as part of the first phase of ASX’s stress-testing enhancements, since ASX plans to investigate changes to the way in which these shocks are applied as part of its second phase of enhancements (see Section 5.4.4).

48 In theory, absolute returns – and therefore the severity of price shock scenarios – should rise in line with the square root of the holding period, although if returns are positively autocorrelated they will rise by more than this. While autocorrelated returns cannot persist in an efficient, liquid market, it is possible that such returns could be observed over a run of days in a stressed market.

5.4.4 Selection of scenarios and methodology

Historical scenarios

ASX applies a range of scenarios based on 20 years of historical data in its stress-testing approach. These historically based scenarios are drawn from an actual or simulated distribution based on the targeted once-in-20-year confidence level.

The methodology applied by ASX to construct historically based scenarios varies by scenario type. For scenarios that involve shocks to a single risk factor, ASX uses the most extreme observed movement in the previous 20 years. For scenarios that involve shocks to multiple risk factors, a simulated joint distribution is constructed based on 20 years of price history, using a student t distribution and Monte Carlo simulation to generate additional data points.⁴⁹ ASX has to assume a structure for the scenarios that it draws from this joint distribution so as to be able to draw a combination of price shocks that meet the desired confidence level. For interest rate contracts, ASX bases its scenarios on one of ten particular combinations of co-movements of yields at different maturities.⁵⁰

- *Parallel shifts* shock yields up or down across all points on the yield curve.
- *Tilts* involve changes to the gradient of the yield curve. The tilt scenarios involve fixing yields at either the short or long end of the curve, and shocking yields at the opposite end of the curve either up or down. The middle of the curve moves in the same direction as this shock, but by a smaller magnitude.
- *Twists*, like tilts, involve a change to the gradient of the yield curve, but instead fix yields in the middle of the curve while adjusting short and long end yields up or down in opposite directions.
- *Bends* apply shocks to the middle of the yield curve, either up or down, that are opposite in direction to shocks applied to the short and long ends.

These yield curve shocks are combined with either an increase or decrease in equity prices. Within the structures of these yield and equity price co-movements, simulated scenarios are chosen according to the desired confidence level. Assumptions regarding the correlation between different risk factors (between equity and yield moves, and between yields of different maturities) play a key role in determining the relative sizes of shocks within each of these structures. In addition, ASX considers various forms of basis risk in its exchange-traded and OTC products (which may be cross-margined). These scenarios allow for a breakdown in the established correlations between futures and swap contracts, the spread between the BBSW and AONIA rates, and spreads across various swap rate tenors.

ASX Clear (Futures) has extended its approach to shocking correlations between equity price and interest rate movements at historical maximum boundaries. These changes have introduced assumed correlations that approximately span the range of historical observations, rather than relying on average correlations observed in the previous 12 months or correlations observed only in the context of certain events.⁵¹ In addition, as part of a second phase of enhancements to stress testing, ASX is proposing further sensitivity analysis of its approach to modelling shocks that affect the shape of the yield curve. ASX will be examining the effects of relaxing the assumed correlations between the

49 The use of a student t distribution allows ASX to model fatter tails than would result from a normal distribution.

50 The relevant maturities are currently at 90 days (short end), three years (middle) and 10 years (long end).

51 ASX uses pair-wise average annual correlations between equity prices and yields on its three largest interest rate futures contracts to estimate this range.

different points on the yield curve in order to investigate the impact of stresses that arise from other plausible combinations of yield co-movements and whether they generate greater losses than the current twists, bends and tilts.

ASX has also reviewed its approach to stressing correlations between equity prices in different sectors in ASX Clear. Currently, the stress-testing approach for ASX Clear applies sector-specific shocks in isolation, assuming that prices remain stable in all other sectors and the market as a whole. Particularly for the larger sectors, an isolated shock of this nature seems implausible. In addition, only if a participant had a very highly skewed portfolio would such a shock be more severe than the broader market-wide shock scenario. In order to provide a more meaningful estimate of stressed exposures arising from shocks that fall primarily on a particular sector, ASX is planning to add scenarios that apply sector-specific shocks in the context of a broader market-wide price movement. These will come into effect in ASX's second phase of stress-test enhancements.⁵²

ASX's approach to constructing historically based scenarios ensures that single risk factor scenarios take into consideration the peak historical price movements observed over the previous 20 years. However, in the case of scenarios that involve multiple risk factors, the simulation approach does not guarantee that the combination of risk factor moves will fully capture (or be at least as severe as) those actually observed in extreme 'stress' events. This is because only a representative sample of combinations of price movements can be captured in the finite set of scenarios used in stress testing; in some cases a historical event may generate an unusual combination of risk factor movements that affects some portfolios more heavily than would a combination of multifactor movements generated from a simulated distribution. Similarly, historical events that fall outside the 20-year look-back period are not covered. This includes the stock market crash of 1987.⁵³

In order to better understand the impact of severe historical events, ASX includes additional 'for information' scenarios based on historical events both within and outside the 20-year look-back period, including the 1987 stock market crash. Further 'additional information only' scenarios are intended to be added as part of the second phase of stress-testing enhancements.

Forward-looking scenarios

ASX has previously relied largely on the use of historically based scenarios in constructing its stress tests. By contrast, ASX's international benchmarking suggested that CCPs typically use a wide range of hypothetical scenarios for both fund sizing and management information. In response, ASX has introduced a series of forward-looking hypothetical scenarios motivated by external 'macro' events, such as shocks stemming from natural disasters, collapses in commodity prices or offshore sovereign defaults (Table 12). In discussions with ASX, the Bank has sought to ensure that the macro events selected could feasibly generate significant shocks to relevant risk factors over the three-day holding period.

These forward-looking scenarios have been constructed with reference to domestic or overseas events of a similar nature, with judgement applied to ensure that the resultant shocks are plausible in the current Australian context. Consideration is given to the likely sensitivity of different risk factors to

52 These sector 'de-correlation' shocks have been included in reverse stress tests since June 2015.

53 The All Ordinaries Index experienced a three-day price fall of 28 per cent in October 1987, nearly twice the 14.3 per cent price fall in ASX's revised stress-test scenarios. The fall was even greater for the Share Price Index futures contract, which experienced a single-day price fall of 34.2 per cent. This in part reflected that the contract was relatively new and liquidity was low.

each scenario. For example, a corporate or sovereign default is likely to have a significant impact on short-term interbank rates, with a relatively smaller impact on longer-term interest rates.

ASX intends to expand the suite of its forward-looking scenarios over time, applying the most relevant of these at any point in time in its calibration of the default fund and AIMs calls, while using the remainder of such scenarios for management information. The initial set of macro event-based scenarios is active for AIM purposes in ASX Clear (Futures). The equivalent set of scenarios in ASX Clear is being monitored closely for management information, but is not initially active for AIM purposes. ASX plans to make these scenarios active in ASX Clear alongside planned enhancements to its risk management system (see Section 3.5.6).

In a second phase of enhancements to its stress-testing approach, ASX proposes to introduce a series of additional forward-looking for-information scenarios that address situations in which one or more defaults (either by participants in the CCP or in related markets) introduces stress to key risk factors. This stress could be transmitted by information effects, disruption to markets or interference with normal default-management processes. More generally, ASX intends to significantly expand the range of ‘for information’ scenarios that it maintains in order to inform management understanding of emerging risks. These could include scenarios that are thought to be ‘beyond plausible’.

Table 12: Proposed Forward-looking Scenarios

Phase I (Macro scenarios)	Phase II (Potential market/default scenarios)
Inflationary shock: oil crisis during a housing bubble	Major bank funding pressure
Commodity collapse: China hard landing	Contagion from public announcement of participant default
Collapse of multiple power plants	Default of ASX's two designated default brokers
Natural disaster	Default of participants with highly concentrated positions
Significant sovereign or corporate default	Multiple participant defaults (up to four)
	Actual overseas events from global financial crisis (e.g. multiple bank rescues)

Source: ASX

Other methodological enhancements

Along with enhancements flowing from the major recommendations of the external validation report, ASX is implementing a number of other methodological enhancements to its stress-testing framework. These enhancements include a scaling up of shocks for contracts with highly concentrated positions, to take into account reduced liquidity in these contracts following a default. Participants with gross or net market positions that account for more than 25 per cent of total exposure will be subject to an increase in the price shock applied to the relevant contract(s).

ASX also intends to investigate a number of other technical changes to its methodological approach as part of its second phase of enhancements. These include the introduction of an absolute floor on shocks to yields (i.e. a basis point shock) on interest rate products, or a shock applied directly to contract prices, since existing scenarios based on a relative (percentage) shock to yields may understate risks should Australia move into a sufficiently low rate environment. Indicators of such an environment are currently monitored monthly as part of capital stress test forward-looking and market indicators.

5.4.5 Reverse stress testing

While outside the scope of the external validation report that has motivated many of the preceding changes to ASX's stress-testing framework, ASX has made further enhancements to its reverse stress-testing approach, including in response to recommendations in the Bank's 2013/14 Assessment. ASX carries out reverse stress testing on a monthly basis, to identify scenarios that would result in the exhaustion of available prefunded financial resources, but that are more extreme than those considered in the capital stress tests. ASX considers the extreme shocks that would exhaust financial resources under a Cover 2 assumption based on participants' current portfolios.

In addition to its routine monthly reverse stress testing, ASX has developed a flexible framework for reverse stress testing that allows it to define particular combinations of assumptions that can be varied for the purposes of ad hoc analysis. These include increases in the size, or changes in the direction, of participants' positions and the magnitude of shocks applied to these positions, as well as changes to the number of participants that are assumed to default.

One area of enhancement to reverse stress testing that was recommended in the Bank's 2013/14 Assessment was to take better account of potential extreme sector-specific equity shocks in ASX Clear. As noted above, ASX is planning changes to its stress-testing approach to take better account of such risks in its routine stress-testing scenarios for ASX Clear, and has implemented a similar approach involving sector-specific shocks as part of its June 2015 monthly reverse stress-testing process.

5.5 Conclusions and Recommendations

ASX has made significant enhancements to its stress-testing framework, in part motivated by findings of the external validation that was carried out towards the end of the 2013/14 Assessment period. The Bank's assessment is that ASX has observed all the relevant minimum requirements in the FSS. The Bank has nevertheless identified a number of areas in which ASX could usefully enhance its observance of the relevant standards in the spirit of continuous improvement, consistent with ASX plans to further refine its stress-testing approach over the coming period.

ASX has already undertaken to carry out work in many of the areas covered by the recommendations as part of a second phase of its stress-testing framework improvements. The Bank therefore expects ASX's stress-testing approach to continue to evolve over the coming period, both to incorporate planned refinements as part of the second phase of its enhancements, and to take into account developments in the international policy work on stress testing. On the basis of changes already implemented under phase 1, the Bank has drawn a number of key conclusions:

- *Selection of risk factors.* An extension of the coverage of risk factors at ASX Clear (Futures) is appropriate, and ASX should continue to review coverage as participants' positions evolve over time, to ensure that all material risks remain subject to stress testing.
- *Confidence level and holding period.* ASX's settings for confidence level and holding period meet the requirement to calibrate stress scenarios to 'extreme but plausible' market conditions. ASX should nevertheless continue to review this interpretation in light of evolving international best practice, including outcomes of the CPMI-IOSCO work.
 - It is reasonable to expect that it would take longer to close out positions in stressed market conditions, and therefore an extension of the holding period to three days for exchange-traded products is appropriate.

- The reduction in ASX’s targeted confidence level from once-in-30 to once-in-20 years still provides for a sufficient level of prefunded financial resources. However, the planned introduction of additional for-information scenarios based on higher confidence levels (once-in-30 and once-in-40 years) should provide valuable information regarding the resilience of the CCPs to more extreme events.
- *Scenario selection and methodology.* Refinements to ASX’s scenario selection and stress-testing methodology improve the sensitivity of the stress-test models to a wider range of shocks.
 - The introduction of forward-looking hypothetical scenarios is an important complement to historically based scenarios; ASX is, however, encouraged to implement planned enhancements to incorporate a broader range of market disruptions or default-related events, and to make active existing forward-looking scenarios in ASX Clear.
 - The incorporation of additional for-information scenarios based directly on historical events will usefully complement existing scenarios drawn from a historically based distribution.
 - Planned refinements to the methodology used to stress assumed correlations between risk factors in both CCPs are beneficial (including planned sensitivity analysis on the assumed shape of the yield curve in ASX Clear (Futures)).
 - There is merit in considering the introduction of an absolute floor on shocks to yields on interest rate products should Australia move to a sufficiently low rate environment.
- *Reverse stress testing.* The introduction of sector-specific shocks into reverse stress testing for ASX Clear will usefully complement the existing analysis of sensitivity to market-wide movements.

Table 13 summarises the Bank’s assessment of the ASX CCPs against the specific sub-standards of the FSS that address matters related to capital stress testing, applying the rating system described in Section 2.2. Table 13 includes the Bank’s recommendations and identifies areas in which the Bank will continue to monitor developments during the 2015/16 Assessment period.

Table 13: Ratings and Recommendations on Stress-testing Related Standards for ASX CCPs

Standard	Rating	Recommendation
<p>4.4. Coverage of stress scenarios</p> <p>... a central counterparty ... 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 two participants and their affiliates that would potentially cause the largest aggregate credit exposure for the central counterparty in extreme but plausible market conditions.</p>	Observed	ASX is encouraged to continue to review its interpretation of 'extreme but plausible' market conditions in light of evolving international best practice, including outcomes of CPMI-IOSCO work on stress testing.
<p>4.5. Performance and review of stress tests</p> <p>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.</p>	Observed	The Bank will continue to monitor the monthly review and ongoing validation of the ASX CCPs' capital stress-testing models, including the annual external validation.
<p>4.6. Range of scenarios and reverse stress tests</p> <p>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</p> <p><i>Guidance 4.6.2.</i> A central counterparty should also conduct, as appropriate, reverse stress tests aimed at identifying the extreme scenarios and market conditions in which its total financial resources would not provide sufficient coverage of tail risk. Reverse stress tests require a central counterparty to model hypothetical positions and extreme market conditions that may go beyond what are considered extreme but plausible market conditions in order to help understand margin calculations and the sufficiency of financial resources given the underlying assumptions modelled ... A central counterparty should develop hypothetical very extreme scenarios and market conditions tailored to the specific risks of the markets and of the products it serves. Reverse stress testing should be considered a helpful management tool but need not, necessarily, drive the central counterparty's determination of the appropriate level of financial resources.</p>	Observed	<p>ASX is encouraged to implement the planned second phase of enhancements to its stress-testing models, including to:</p> <ul style="list-style-type: none"> • make active in ASX Clear 'forward-looking' hypothetical scenarios that represent macroeconomic or market-wide events, currently used for information only • incorporate further scenarios based on peak historic price volatilities within the Board-approved historical look-back period, and additional scenarios for information only based on peak historic price volatilities beyond this period • introduce a framework for collectively shocking individual sectors in ASX Clear that takes into account the potential for coincident broader market-wide shocks • introduce additional forward-looking scenarios for information only that address the potential impact of market disruptions, multiple defaults and any dependencies on defaulting participants that might affect the default management process • perform additional sensitivity analysis on the assumed shape of the yield curve in stress-test scenarios

Standard	Rating	Recommendation
		<ul style="list-style-type: none"> introduce additional scenarios for information only that address situations that may be regarded as beyond 'extreme but plausible'. <p>ASX Clear (Futures) is encouraged to continue to monitor the impact of absolute versus relative changes in yields for applying shocks to interest rate contracts and ensure that appropriate absolute floors for yield shocks are implemented where appropriate.</p> <p>The Bank will continue to monitor ASX's ongoing use of reverse stress testing to test the assumptions used in its capital stress tests, including ASX Clear's enhanced approach to reverse stress testing of sector-specific shocks.</p>
<p>4.7. Use of stress-test information</p> <p>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.</p>	Observed	<p>The Bank will continue to monitor ASX's use of stress testing to review the sufficiency of its pooled financial resources and to call additional margin from participants as appropriate.</p>

6. Special Topic – Recovery Planning

Recovery plans are developed by an FMI within the framework of its rules and contractual arrangements to provide for a return to viability in the event of an extreme financial shock. The Bank's FSS require that CCPs and SSFs develop and maintain recovery plans in order to ensure that they could continue to provide critical clearing and settlement services following a threat to their continued viability. In the case of CCPs, recovery plans include arrangements to address shocks that go beyond those assumed in stress testing (see Section 5).

The Bank's 2013/14 Assessment recommended that ASX Clear, ASX Clear (Futures), ASX Settlement and Austraclear take steps to enhance their recovery plans. In the case of the ASX CCPs, ASX Clear and ASX Clear (Futures), the recommended steps included the implementation of arrangements to fully address any uncovered credit losses and replenish financial resources following a participant default, as well as arrangements to fully meet any liquidity shortfall.

The recommendation noted ongoing international work by CPMI and IOSCO to provide guidance to the industry on recovery planning. This guidance was released in October 2014.⁵⁴ In the same week, ASX launched its consultation on a package of tools to enhance its ability to effectively recover from a participant default that exhausted the CCPs' prefunded financial resources. On 21 April 2015, ASX released a set of draft rule changes that incorporated its response to feedback from consultation. The final rule changes were lodged with ASIC on 1 September and are due to take effect on 1 October 2015.⁵⁵

This section summarises the key recovery planning requirements in the FSS, provides an overview of ASX's forthcoming recovery plans and presents the Bank's assessment of these arrangements. ASX has made significant progress in enhancing its recovery arrangements and is found to have observed all relevant requirements of the FSS, with the exception of requirements related to replenishment. In the case of replenishment, ASX is found to have broadly observed the relevant requirements. The Bank has made a recommendation outlining further steps required for ASX to achieve full observance.

6.1 Overview of FSS Requirements

The majority of the Bank's FSS requirements related to recovery planning came into effect on 31 March 2014.⁵⁶ The core requirements for recovery planning and addressing non-default losses apply to both CCPs and SSFs, but the full range of requirements apply only to CCPs, which unlike SSFs

54 See CPMI-IOSCO (2014), *Recovery of Financial Market Infrastructures*, Bank for International Settlements, Basel, available at <<http://www.bis.org/cpmi/publ/d121.htm>>. The strengths and weaknesses of the tools described in the CPMI-IOSCO guidance are discussed in Gibson M (2013), 'Recovery and Resolution of Central Counterparties', *RBA Bulletin*, December, pp 39–48.

55 Implementation is subject to the relevant Minister's power, under Section 822E of the Corporations Act, to disallow rule changes within 28 days of lodgement with ASIC.

56 While the Bank's new FSS came into effect on 29 March 2013, the requirements related to recovery (other than CCP Standard 14.5) were among a small number of standards that were subject to 12 months of transitional relief. This relief reflected that observance of these requirements was partly dependent on the development of international guidance on recovery planning then underway.

are exposed to financial risks on the default of a participant. Extracts from the relevant FSS sub-standards for CCPs are included in Table 14 (see Section 6.3).

- *Recovery plans.* CCPs and SSFs are required to identify scenarios that could threaten their ongoing provision of critical services and prepare appropriate plans for recovery or orderly wind-down to address such scenarios (CCP Standard 3.5 and SSF Standard 3.5).
- *Loss allocation and replenishment.* CCPs are required to establish arrangements to fully address any losses resulting from the default of one or more participants, as well as replenish any financial resources employed to meet such losses (CCP Standard 4.8).
- *Addressing a liquidity shortfall.* CCPs are required to establish arrangements that would allow them to settle their payment obligations on time following the default of one or more participants. These include arrangements to address liquidity shortfalls that could not be addressed using 'qualifying' liquid resources alone (CCP Standard 7.9).⁵⁷
- *Addressing non-default losses and recapitalisation.* CCPs and SSFs are required to hold or have access to sufficient liquid net assets backed by capital to cover potential losses arising from sources other than a participant default (i.e. general business risks) and to fund implementation of their recovery plans. The CCP or SSF should also maintain a viable plan for raising additional funds in order to ensure that it retains the required level of general business risk capital, including after a shock that depleted its capital (CCP Standards 14.3 and 14.5, and SSF Standards 12.3 and 12.5).

The Bank has advised ASX that it will apply the CPMI-IOSCO guidance in interpreting its application of the above requirements. The guidance is not prescriptive as to which recovery tools an FMI should adopt. Rather, it outlines a menu of potential recovery tools with reference to a set of desired characteristics:

- *comprehensiveness* – the set of tools should comprehensively address how the FMI would continue to provide critical services in all relevant scenarios
- *effectiveness* – each tool should be reliable, timely and have a strong legal basis
- *transparency, measurability, manageability and controllability* – the tools should be transparent and allow participants to measure, manage and control their exposure to the tools
- *creating appropriate incentives* – the tools should create appropriate incentives for the FMI's owners, direct and indirect participants, and other stakeholders
- *minimising negative impact* – the tools should be designed to minimise negative impact on participants and the broader financial system.

The assessment of ASX's recovery proposals presented in this section uses these desired characteristics as a guide. To support this assessment, the Bank engaged in a continuing dialogue with ASX during the development of its recovery proposals and met with a number of participants and end users to better understand the potential implications of the measures.

57 Qualifying liquid resources for the purpose of the FSS are defined under CCP Standard 7.4.

6.2 ASX's Recovery Framework

As noted in the 2013/14 Assessment, in early 2014 ASX developed a basic recovery plan based on its clearing and settlement (CS) facilities' existing powers. While this plan identified a number of tools available to ASX to partly address uncovered credit losses and liquidity shortfalls, replenish financial resources and address a non-default-related loss, it acknowledged that these tools were not sufficient to comprehensively address the full range of threats to the ASX CS facilities' continued provision of critical services as required by the new FSS. ASX's enhancements to its recovery planning arrangements, supported by forthcoming changes to the ASX CCPs' operating rules, are designed to address these previous shortcomings and ensure that ASX's recovery plans meet the requirements summarised in Section 6.1.

In the process of introducing recovery-related changes to the CCPs' operating rules, both ASX and the Bank consulted with participants and other stakeholders. These discussions revealed a wide range of views, but there was recognition among participants that recovery measures along the lines proposed were necessary to improve the resilience of ASX's clearing and settlement (CS) facilities to a very extreme shock. Stakeholder comments were largely directed towards questions of design, such as the appropriate mix of recovery tools, thresholds for activating the use of tools, and the ability to control or estimate contingent exposures. Stakeholders were also concerned about any potential prudential capital implications of tools.

The remainder of this section provides more detail on the tools proposed by ASX and notes how these align with the 'desirable characteristics' set out in the CPMI-IOSCO guidance (see Table 15 for a summary mapping of ASX's tools against these characteristics). The focus of this discussion is on recovery arrangements for the ASX CCPs, with the only element relevant to the SSFs being the discussion about tools to address non-default losses. As in the CPMI-IOSCO guidance the tools in ASX's recovery framework encompass: tools to allocate losses and restore a matched book following a participant default; tools to address a liquidity shortfall; replenishment tools; and tools to address a non-default-related loss.

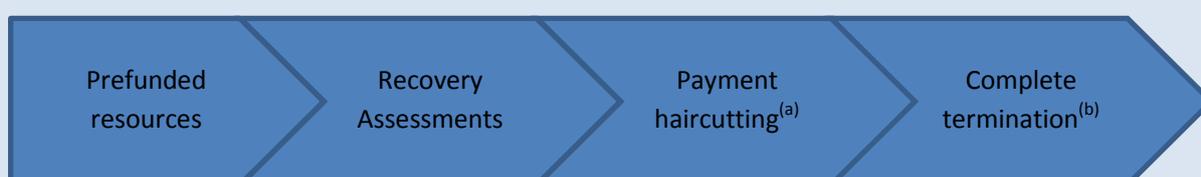
6.2.1 Tools to allocate losses and restore a matched book following a participant default

The suite of tools included in ASX's proposals to allocate losses and restore a matched book are summarised in Box C and discussed in further detail below.

Box C: Summary of the ASX CCPs' Proposed Tools to Allocate Losses and Restore a Matched Book

The ASX CCPs maintain prefunded financial resources (such as participant margin and a pooled default fund) calibrated to cover the default of any two participants and their affiliates in extreme but plausible market conditions (see Section 3.3). However, in very extreme cases it is possible that this prefunded financial cover could be insufficient to fully absorb default-related losses, leaving the CCP with an uncovered credit loss. ASX's proposed approach for allocating such an uncovered credit loss following a participant default differs between the two CCPs, but applies the same basic sequencing (Figure 1). The two CCPs also apply similar approaches to restoring a matched book, although there is some flexibility in the sequencing of both tools to allocate losses and to restore a matched book.

Figure 1: Tools to Allocate a Loss in the ASX CCPs



(a) Payment haircutting is available in ASX Clear (Futures) only

(b) Complete termination can be used to restore a matched book as well as to allocate a loss; partial termination is an alternative tool for restoring a matched book that would typically be contemplated prior to complete termination

In the event that prefunded financial resources were exhausted, the following tools would be available to the ASX CCPs.

- *Recovery Assessments.* The power to call for additional cash contributions from participants to meet uncovered losses, in proportion to the risk associated with positions held by participants prior to the default. Capped at \$300 million in ASX Clear and \$600 million in ASX Clear (Futures) (or \$200 million for a single default).
- *Payment haircutting.* A tool allowing the CCP to reduce (haircut) outgoing payments to participants in order to allocate losses suffered on the defaulting participant's portfolio. For example, a haircut may be applied to variation margin payments due to participants with net in-the-money positions in the event of mark-to-market loss on the defaulter's portfolio. This haircutting power is uncapped at ASX Clear (Futures), but is not available at ASX Clear due to the characteristics of the products that it clears.
- *Partial termination.* A power which could be used to close out a CCP's market risk on the defaulter's portfolio if normal close-out processes were not available or proved ineffective. The CCP would identify (on a pro rata basis) positions held by non-defaulting participants that were opposite to those that the CCP had inherited from the defaulter. These positions would then be terminated at their current market value, restoring the CCP to a matched book.
- *Complete termination.* A reserve power that could be used to restore a matched book and/or allocate losses if none of the above tools proved effective. Complete termination would involve tearing up all open contracts at the CCP and settling them at their current market value. Any residual losses of the CCP could be allocated by haircutting settlement payments to participants. Use of this tool would have a highly disruptive effect on the markets served by the CCP, so would be considered only as a last resort.

Loss allocation

As noted in 'Box C: Summary of the ASX CCPs' Proposed Tools to Allocate Losses and Restore a Matched Book', both CCPs would initially seek to allocate uncovered losses via Recovery Assessments. ASX Clear has a pre-existing assessment power in its rules. ASX Clear (Futures) did not previously have such a power.

- For ASX Clear (Futures), assessments would be capped at \$200 million per participant default, up to a maximum of \$600 million for multiple defaults within a defined 'default period'.⁵⁸ This represents a maximum of 31 per cent of the ASX Clear (Futures) default fund in the case of a single default, or 92 per cent in the case of multiple defaults.
- For ASX Clear, assessments would be capped at \$300 million for one or multiple defaults. ASX Clear's assessment power represents 120 per cent of its default fund.

The different levels of coverage achieved under the CCPs' respective Recovery Assessment powers reflect that ASX Clear (Futures) has additional loss allocation tools available if assessments were exhausted.

In the case of ASX Clear (Futures), if the CCP reasonably expects that losses may exceed default resources, including Recovery Assessments, the CCP could start haircutting gains-based payments to participants with net in-the-money positions (payment haircutting). While the largest payment obligations subject to a haircut would generally be variation margin payments, ASX has expanded the range of payments potentially subject to a haircut in response to feedback from stakeholders, including, for instance, net interest payments resulting from a rate reset. ASX would also have the discretion to retain a portion of default resources, including those raised via assessments, while carrying out payment haircutting, to meet any costs of settling an auction or other losses associated with closing out the defaulting participant's positions.

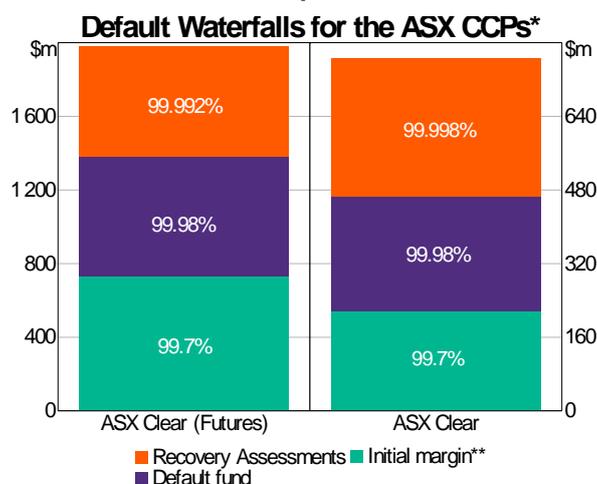
It is not proposed that ASX Clear would have the ability to haircut (variation margin) payments. This is because variation margin is applied differently to the products cleared by ASX Clear, and in general is collected on losses but not paid out on gains. Instead, ASX Clear has a more extensive assessment power that more than doubles its capacity to absorb losses above the defaulting participant's margin. If assessment funds were nevertheless exhausted in ASX Clear, it would allocate remaining losses by terminating all open contracts (see below) and applying a haircut to any settlement payments to participants.

Graph 12 illustrates how loss allocation tools relate to the overall default waterfalls of each CCP. In the event that the two largest participants defaulted, the first layer of loss absorbency would be the initial margin posted by those two participants, calibrated to cover losses to a 99.7 per cent confidence interval. The pooled default fund of each CCP would be used to absorb any losses that resulted from more extreme market conditions, calibrated to cover 99.98 per cent of the distribution of price moves.⁵⁹ In even more extreme conditions, assessments would provide coverage up to an estimated 99.998 per cent (once-in-200-year) confidence level in ASX Clear, or 99.992 per cent (once-in-50-year) confidence level in ASX Clear (Futures).

58 The default period concludes 22 business days after the conclusion of the final default management process initiated during the period. Subsequent defaults within this period would therefore extend the default period by a further 22 business days from the point at which the subsequent default management process was successfully concluded.

59 Section 5 explains in more detail how the default funds are calibrated using stress testing. The estimated confidence intervals for the default fund and assessments are based on historical price data, assuming a student t distribution where necessary to extrapolate prices beyond the sample used.

Graph 12



* Default waterfalls for ASX CCPs assuming the implementation of proposed recovery tools; percentages indicate probability of losses falling within each layer of the waterfall
 ** Average initial margin for the two participants with the largest stress-test losses for the June quarter 2015
 Source: ASX

Characteristics of loss allocation tools

The loss allocation tools at the two CCPs are assessed to meet each of the desirable characteristics of recovery tools set out by CPMI and IOSCO.

- **Comprehensiveness.** Both CCPs maintain loss allocation arrangements that can comprehensively allocate an uncovered loss arising from a participant default.
 - ASX Clear relies primarily on assessments to allocate uncovered losses; ASX modelling indicates that these would be sufficient to allocate uncovered losses following the default of the two largest participants in a once-in-200-year market stress event. In circumstances involving even more extreme market moves or more than two participant defaults in very extreme market conditions, ASX Clear could still allocate remaining losses via its complete termination power.
 - ASX Clear (Futures) can comprehensively allocate nearly all uncovered losses via a combination of assessments (covering the default of the two largest participants in a once-in-50-year market stress event) and payment haircutting. Complete termination can be used to allocate any remaining losses that are generated from sources other than payment flows and cannot be met by other resources (including assessments).
- **Effectiveness.** The tools available to each CCP are designed to be reliable, timely and have a strong legal basis.
 - Assessment obligations are payable on a next-day basis and are enforceable under the CCPs' rules. A failure to meet assessment obligations is an act of default and would enable the CCP to use the non-performing participant's initial margin to offset any assessment shortfall.
 - Payment haircuts are applied to reduce settlement of payment obligations by an amount equal to the losses that need to be allocated. There is no risk of non-performance since the haircut operates as a reduction in amounts payable by the CCP rather than an obligation of

the participants to pay in any funds.

- ASX has carried out analysis on the legal basis for its loss allocation tools. This analysis has not identified any material legal risk to enforceability of the assessment and payment haircutting powers or the application of protections under Part 5 of the PSNA to payment haircutting. ASX has recommended amendments to the PSNA to remove any uncertainty that protections under the PSNA would apply in the unlikely event that an assessment was called from a participant that itself later entered insolvency. This change is currently under consideration by Treasury.
- *Transparency and controllability.* In the Bank's view, the tools available are transparent, allowing participants to measure, manage and control their exposures.
 - Participants have a capped exposure to assessments.
 - Potential exposure to payment haircutting can be controlled, since it is related to the size of participant's positions; ASX provides participants with sufficient information to allow them to calculate their potential exposures.
- *Incentives.* Both assessments and payment haircutting are linked to the positions held by participants, which assists in creating appropriate incentives for participants and their clients to manage the risk that they bring to the CCPs. Caps on assessments also reduce the risk that participants will exit central clearing, which they might have an incentive to do if they had a potentially uncapped exposure in the event of recovery.
- *Minimising negative impact.* The proposed sequencing of tools would be expected to limit the potential for negative impact on participants and the broader financial system. Assessments distribute losses widely among participants in proportion to their level of activity. While payment haircutting concentrates losses in fewer participants, it would be unlikely to trigger by itself further participant defaults except in the most extreme cases. Research undertaken by the Bank based on global derivatives exposures suggests that losses allocated via payment haircutting would still be widely dispersed, which should limit the potential for the transmission of stress.⁶⁰ The most severe impact, from complete termination, would be reserved for very extreme cases only.

Restoring a matched book

Both CCPs would have the power to force the settlement or termination of some or all open contracts in order to restore a matched book if the defaulter's positions could not be closed out in the market or by auction. While both CCPs already have partial termination powers in relation to their exchange-traded derivatives, ASX will extend these powers to OTC derivatives and cash market transactions. In addition, ASX is introducing a power to simultaneously terminate all open contracts as a last resort should other tools prove ineffective (complete termination).

60 See Heath, Kelly and Manning (2015), 'Central Counterparty Loss Allocation and the Transmission of Financial Stress', RBA Research Discussion Paper No 2015-02, available at <<http://www.rba.gov.au/publications/rdp/2015/2015-02.html>>.

ASX's partial termination powers align with a set of safeguards for the use of this tool as set out by the International Swaps and Derivatives Association (ISDA) in a January 2015 discussion paper.⁶¹ In this paper, ISDA expressed cautious support for the use of partial termination as a final alternative to complete termination, which could have a highly disruptive effect. ISDA's support was conditional on three safeguards being met:

- the contracts terminated should be selected on a pro rata basis to diffuse its impact among multiple participants
- terminated contracts should be settled at market value
- partial termination should not be used to allocate losses.

These safeguards address industry concerns that participants with directional positions would be more exposed to the use of this tool, and seek to mitigate the risk that partial termination could lead to unpredictable effects on net exposures if some contracts were selected for termination while leaving offsetting contracts in place. ISDA's safeguards are also designed to avoid partial termination powers interfering with the accounting and capital treatment of net positions.

Characteristics of tools to restore a matched book

The tools to restore a matched book at the two CCPs are assessed to meet each of the desirable characteristics of recovery tools set out by CPMI and IOSCO.

- *Comprehensiveness.* The combination of partial and complete termination powers should ensure that both CCPs could restore their matched books in extreme circumstances.
- *Effectiveness.* Partial and complete termination powers could be applied in a timely and reliable manner, since ASX has the power to unilaterally force the settlement of open contracts to restore its matched book. ASX's legal analysis has not identified any material legal risk to enforceability of these powers or the application of protections under Part 5 of the PSNA.
- *Transparency and controllability.* Partial termination would be applied on a pro rata basis, allowing participants to manage and control their exposure to the tools via the size of their positions. An element of unpredictability would nevertheless remain since participants' net positions could be partially unwound. The impact of complete termination is fully transparent since all positions would be affected.
- *Incentives.* The threat of termination powers should provide incentives for participants to support default management processes. For example, uncertainty as to the impact of partial termination, or the threat of complete termination, could provide an incentive for participants to bid competitively in the auction of a defaulting participant's portfolio.
- *Minimising negative impact.* The availability of partial termination as an alternative to complete termination (where feasible) should limit the likelihood that the latter would be required to restore a matched book. This would allow the CCP's matched book to be restored in the least harmful way possible.

61 ISDA's discussion paper is available at <<http://www2.isda.org/attachment/NzE5OQ==/CCP%20Default%20Management%20recovery%20and%20continuity%2026-01-2015.pdf>>.

6.2.2 Tools to address a liquidity shortfall

ASX's arrangements to address a liquidity shortfall differ significantly between the two CCPs, reflecting the different liquidity risk profiles associated with the products that each CCP clears.

The primary liquidity obligations faced by ASX Clear (Futures) relate to the daily mark-to-market process. Accordingly, once pre-funded liquidity and liquidity sourced from Recovery Assessments were exhausted, payment haircutting would provide ASX Clear (Futures) with the means to comprehensively address any liquidity shortfall.

ASX Clear has an additional existing tool to address any liquidity shortfall associated with the settlement of securities transactions – OTAs. This tool is effectively a rules-based stock repurchase arrangement under which ASX Clear may source liquidity from participants that are due to deliver securities for settlement, using those securities as collateral for the liquidity that they provide. The transaction unwinds the next day.⁶² As a last resort, complete termination could be used to address any remaining liquidity shortfall.

Liquidity risk on ASX Clear's derivatives trades is more limited than for ASX Clear (Futures) since it collects but does not pay out variation margin on most products. For remaining liquidity obligations, including variation margin payments on the few products for which gains are paid out, once pre-funded liquidity and an existing \$150 million liquidity line were exhausted, ASX Clear would rely on funds received from Recovery Assessments (\$300 million). If these resources still proved insufficient, any remaining liquidity shortfall would be addressed via complete termination.

Characteristics of tools to address a liquidity shortfall

The tools to address a liquidity shortfall at the two CCPs are assessed to meet each of the desirable characteristics of recovery tools set out by CPMI and IOSCO.

- *Comprehensiveness.* The combination of assessments and payment haircutting (for ASX Clear (Futures)) or OTAs (for ASX Clear) provide a comprehensive means of addressing a liquidity shortfall. Any residual shortfall in ASX Clear related to derivatives transactions could be addressed via complete termination.
- *Effectiveness.* OTAs could be applied in a timely and reliable manner, since this tool would be applied directly to ASX's payment obligations to selling participants, which would not be required to pay in any funds. ASX's legal analysis has not identified any material legal risk to enforceability of OTAs or the application of protections under Part 5 of the PSNA.
- *Transparency and controllability.* Participants are able to manage and control their exposure to OTAs via the size of their cash market positions. The Bank is continuing to discuss with ASX how better to disclose the potential impact of OTAs to participants, since this in part depends on the application of ASX's 'back-out' algorithm to select trades to be offset (see Section 3.5.1).⁶³
- *Incentives.* OTAs should provide incentives for participants to manage the level of risk they bring to the CCP, since this risk is linked to the size of participant positions (albeit with adjustments via

62 For a full description of OTAs, see Appendix A1.1, CCP Standard 7.3.

63 The back-out algorithm selects trades to be removed from the CHESSE batch where a participant fails to deliver securities, or trades to be offset by OTA trades where a participant fails to meet its payment obligation. The algorithm is designed to minimise the overall impact to the batch of removing or adjusting trades (see Appendix A2.1, SSF Standard 10.2).

the back-out algorithm to minimise the flow-on effects to batch settlement).

- *Minimising negative impact.* Obligations under OTAs are calibrated (via the back-out algorithm) to minimise the liquidity impact on participants in ASX Settlement's daily batch process.

Other tools are the same as those used to allocate an uncovered loss – the characteristics of these tools are described in the context of loss allocation tools.

6.2.3 Replenishment

ASX has developed a staged process for replenishment of the CCP default funds in the event that these were exhausted or partially drawn on following a participant default. For each CCP, irrespective of whether the default fund was fully or only partially depleted, participants would be given a 17 business-day period from completion of the default management process to determine whether they wished to contribute to replenishment, or instead close out their existing positions and resign from the CCP at the conclusion of the default period. Participants that had not exited their existing positions and provided notice of resignation at the conclusion of the 17 business days would be required to contribute to replenishment of the default fund in proportion to their activity prior to the default. During this period, ASX would rely on initial margin and any remaining default fund resources to cover the CCP's exposures to a subsequent participant default.⁶⁴ ASX would also have the discretion to call AIM from participants based on their stressed exposures, although this would place a greater liquidity burden on participants than a replenishment undertaken on a mutualised basis ('Box D: Liquidity Impact of Replenishment'). This could be procyclical in the context of the stressed environment in which these events might eventuate.

Box D: Liquidity Impact of Replenishment

The design of ASX's replenishment arrangements has implications for the timing and magnitude of liquidity obligations placed on its participants. This box discusses these implications and illustrates them using a stylised hypothetical example.

The purpose of replenishment arrangements is to ensure that a CCP can return to its full level of financial cover, which in the case of the ASX CCPs requires sufficient financial resources to cover the default of the two participants that would give rise to the greatest joint loss in extreme but plausible market conditions (Cover 2). While a prompt return to Cover 2 should be a key objective of a CCP's replenishment approach, replenishment arrangements should take into account the relative risks to participants from, and liquidity impact of, reliance on either pooled or non-pooled resources, or a combination of the two.

- *Non-pooled resources* (e.g. initial margin and AIM) avoid exposing participants to potential loss from a fellow participant default. However, since non-pooled resources can be used only to meet losses arising from the default of the participant that provided them, a greater quantum of resources is required to provide the same level of coverage than would be the case for pooled resources.
- *Pooled resources* (e.g. default fund contributions) would be exposed to loss if a defaulting participant's non-pooled resources proved insufficient to meet losses on its positions. However, a

⁶⁴ Any uncovered losses incurred in such circumstances would trigger the further use of loss allocation tools; for example, ASX Clear (Futures) could use payment haircutting to allocate remaining losses.

lower level of funds would be required from participants to return the CCP to Cover 2 than would be the case for non-pooled resources.

For example, if a CCP had 10 identical participants with stressed exposures of \$100 million each, each participant would be required to provide \$100 million in AIM to return the CCP to Cover 2 (Table D1). In this case there is no distinction between the CCP covering stressed exposures to one or all participants, since AIM provided by one participant cannot be used to meet stressed losses of another participant. Alternatively, the CCP could seek a return to Cover 2 via pooled resources. At most this would require the CCP to rebuild its default fund to \$200 million, assuming that at least two participants held positions subject to common stresses.¹ In the case of a CCP, such as one of the ASX CCPs, that committed to contributing half of this amount, participants would face a replenishment obligation of \$10 million each.

Table D1: Liquidity Impact of a Return to Cover 2^(a)

	Non-pooled resources (AIM)	Pooled resources ^(b)
Aggregate contribution required	\$1 000 m	\$200 m
Contribution per participant	\$100 m	\$10 m
CCP contribution	–	\$100 m

(a) Assumes 10 participants with stressed losses of \$100m each, with at least two participants holding positions in the same direction

(b) Assumes the CCP contributes 50 per cent of the replenished default fund

This stylised example illustrates the heightened liquidity impact on participants – and, therefore, the system more generally – from a reliance on non-pooled resources (such as AIM) to return a CCP to Cover 2. The liquidity impact on participants from reliance on non-pooled resources will be greatest relative to the use of pooled resources where:

- there is a larger number of participants, each of which will need to post AIM on its individual stressed exposures
- the distribution of stressed losses among participants is relatively even, since pooled resources are based only on the two participants with the largest joint exposure
- the CCP contributes a significant portion of pooled resources.

1 In practice, it is not necessarily the case that the two participants giving rise to the highest individual stressed losses will be the participants used to size financial resources on a Cover 2 basis. The two participants with the largest absolute stressed exposure may hold opposing positions that would result in a lower net exposure in the event of a joint default.

If the funds were fully depleted, ASX would match, dollar-for-dollar, contributions made by participants to re-establish default funds of up to \$400 million in ASX Clear (Futures) and \$150 million in ASX Clear. ASX's plans to fund these contributions include the use of existing cash reserves and/or raising additional capital through equity issuance. The Bank has commenced discussions with ASX to better understand these plans, which might need to be implemented in challenging circumstances.

The re-established default funds would initially be smaller than the current default funds in each CCP, on the presumption that the exposures of surviving participants would be smaller. If stress testing demonstrated that the re-established default funds did not adequately cover post-recovery exposures, ASX would have the capacity to call additional participant and ASX contributions to restore the default funds to pre-recovery levels as part of a recalibration at the end of the quarter. This

'scaling-up' process would apply the same 50/50 split of ASX and participant contributions as would apply to the initial post-recovery default fund. ASX is also removing the requirement for a participant ballot to approve an increase in participant default fund contributions if required to scale up the level of financial cover. In the meantime, if post-recovery exposures were not adequately covered, ASX would rely on AIM calls on participants.

In the event that the default fund was partially drawn on rather than fully exhausted, replenishment would occur from a higher base. As in the case of a fully depleted fund, ASX would initially contribute up to \$75 million in ASX Clear and \$200 million in ASX Clear (Futures), with participants again contributing up to the same amount. If this was insufficient to provide the required level of cover, ASX would again rely on the use of additional margin until the default fund could be scaled up. The post-replenishment composition of the default fund would depend on the amount to be replenished; the larger the initial drawdown, the closer would be the post-replenishment composition to a 50/50 split of ASX and participant contributions. In the case of a drawdown of less than \$75 million in ASX Clear, ASX would meet the entire replenishment requirement, preserving the current default fund composition of 100 per cent of ASX funds.

Characteristics of replenishment tools

The replenishment tools at the two CCPs are assessed to meet only some of the desirable characteristics of recovery tools set out by CPMI and IOSCO.

- *Comprehensiveness.* The provisions for both participant and ASX contributions to replenishment provide a path for both CCPs to return to full cover over time.
- *Effectiveness.* The approach to replenishment may not be timely, since there would be a delay of at least 22 business days before the CCPs returned to full mutualised cover (potentially longer if a subsequent 'scaling up' of the default fund was required). The Bank is continuing to discuss with ASX its plans to fund its own contribution to replenishment to ensure that this would be reliable in stressed conditions. ASX has carried out analysis on the legal basis for its replenishment plans. This analysis has not identified any material legal risk to the enforceability of replenishment powers. ASX has recommended amendments to the PSNA to remove any uncertainty that protections under the PSNA would apply in the unlikely event that a replenishment contribution was called from a participant that itself later entered insolvency. This change is currently under consideration by Treasury.
- *Transparency and controllability.* Participants are aware of the full extent of their replenishment obligations in advance, and could avoid replenishment by resigning their participation in the CCP.
- *Incentives.* The current design of replenishment obligations could create inappropriate incentives for participants to resign, since these obligations are initially linked to pre-default positions and could be controlled only by exiting the CCP entirely. Nevertheless, the strength of this incentive is limited by the cap on participants' replenishment contributions.
- *Minimising negative impact.* The approach to replenishment would allow participants sufficient time to obtain approvals and funding to meet their obligations. However, the use of additional margin to manage risk in the interim (22 business-day period) could potentially transmit procyclical liquidity stress by requiring participants to post more collateral than would be the case under mutualised cover.

6.2.4 Non-default losses

Non-default losses could arise from losses on treasury investments or a range of general business risks.

- In the case of investment losses, ASX would apportion any losses in excess of \$75 million (an amount equal to the CCPs' general business risk capital) between participants in proportion to the amount of cash collateral each has provided to the CCP (both margin and default fund contributions).
- Other non-default, general business losses to the CCPs would be absorbed by ASX. Unlike investment losses, general business losses from causes such as a decline in revenues or an increase in operating expenses are likely to be relatively slow-moving in nature. In the case of the SSFs, which are only exposed to non-default, non-investment losses, remaining losses would likewise be absorbed by ASX, including through application of general business risk capital held for the SSFs by ASX Limited. ASX supplements its business risk capital through the use of insurance to cover its exposure to a broad range of risks (including coverage of professional indemnity and fraud risks). ASX Limited has also committed to maintaining adequate levels of business risk capital for the CCPs and SSFs, recapitalising these funds as required.

Characteristics of tools to address a non-default loss

The tools to address a non-default loss at the two CCPs are assessed to meet each of the desirable characteristics of recovery tools set out by CPMI and IOSCO.

- *Comprehensiveness.* Investment losses in excess of business risk capital could be comprehensively addressed via allocation to participants. Other non-investment general business losses would be met via insurance or recapitalisation of general business risk capital used to absorb such losses.
- *Effectiveness.* The allocation of investment losses should be timely and reliable, since any allocation could be offset against participant collateral held at ASX. ASX's legal analysis has not identified any material legal risk to enforceability of investment loss allocation or the application of protections under Part 5 of the PSNA. Non-investment general business losses would typically be expected to be slower to crystallise, allowing time for ASX to process an insurance claim or raise additional capital.
- *Transparency and controllability.* Investment loss allocations would be proportional to the value of cash collateral posted by each participant, allowing participants to manage, measure and control their exposures to this tool. The Bank will discuss with ASX the disclosure of information on its investment risk profile to participants in the context of planned changes to ASX's treasury investment policy (see Section 3.5.4), in part to assist them in understanding their contingent exposure to investment losses. Participants would have no exposure to non-investment general business losses.
- *Incentives.* Investment loss allocations to participants would be proportional to the size of participants' positions with each CCP, strengthening incentives for participants to manage the level of risk they bring to the CCP. The residual exposure of participants to investment losses should provide them with incentives to monitor ASX's management of investment risks.
- *Minimising negative impact.* Allocating excess investment losses to participants on a pro rata basis spreads the impact of this tool as widely as possible.

6.2.5 Safeguards

ASX has incorporated a number of safeguards to govern its exercise of recovery measures, in recognition of the open-ended nature of some of the recovery tools described above, and the discretion held by ASX in exercising its recovery powers. While this flexibility is necessary for ASX to respond effectively to unpredictable circumstances in recovery, this elevates the importance of appropriate mechanisms for transparency and accountability in ASX's decision-making process. ASX therefore proposes to introduce requirements to consult with the Bank regarding any use of recovery tools, and with participant risk committees in each CCP in a broad range of circumstances. For instance, consultation with participant risk committees would be required where payment haircutting extended beyond seven business days or exceeded a certain value threshold, or when exercising partial or complete termination powers.

6.2.6 Updated recovery plan

Prior to its consultation on new recovery tools, ASX had documented a basic recovery plan based on its existing powers. It is in the process of updating this plan in line with the expanded set of recovery tools, alongside a broader refresh of its default management plan. ASX will also be giving consideration to how its recovery plan is maintained and tested on an ongoing basis.

6.3 Conclusions and Recommendations

ASX has made significant enhancements to its framework for recovery over the course of the Assessment period. The Bank's assessment is that ASX has observed all of the relevant minimum requirements in the FSS, with the exception of certain requirements related to replenishment. In the case of replenishment, ASX is found to have broadly observed the relevant requirements, with a recommendation for further action by ASX to achieve full observance. Other recommendations identify steps for continued monitoring and review, or reflect areas where ASX could enhance its observance of the relevant standards in the spirit of continuous improvement. ASX has already commenced work in many of the areas covered by the recommendations.

The Bank's ratings and recommendations are based largely on its analysis of ASX's recovery tools according to the desired characteristics of recovery tools set out in the CPMI-IOSCO guidance. This analysis, set out in Section 6.2, is summarised in Table 15. The key conclusions drawn by the Bank in performing its assessment are set out below.

- *Loss allocation.* ASX's planned loss allocation arrangements are considered to strike an appropriate balance between the use of assessments, which are widely distributed but subject to performance risk, and other tools (payment haircuts or complete termination).
 - ASX has provided modelling that indicates that assessments would be sufficient to cover two defaults during a once-in-50-year event for ASX Clear (Futures) or a once-in-200-year event for ASX Clear. In the latter case, this means that reliance on complete termination to allocate losses would be highly unlikely. Both CCPs have at least one uncapped loss allocation tool and therefore the full package of loss allocation measures is comprehensive.
 - The application of uncapped payment haircutting in ASX Clear (Futures) when assessments have been exhausted minimises both performance risk and the direct liquidity impact on

participants, since it does not rely on the paying in of additional funds. Although payment haircutting would result in a more uneven distribution of losses than assessments,⁶⁵ Bank research suggests that the potential for the transmission of stress would remain limited. ASX has undertaken to provide the Bank with further quantitative analysis to assist in validating the potential impact of payment haircutting based on historically observed participant positions in ASX Clear (Futures).

- *Restoring a matched book.* The Bank's view is that ASX's arrangements provide an appropriate suite of tools to restore a matched book. The amendments to partial termination powers align with industry expectations voiced by ISDA and provide a potentially less disruptive means of restoring a matched book than complete termination. It is appropriate to retain complete termination as a reserve power. However, once the proposed special resolution regime for FMIs comes into effect, the Bank would have the capacity to intervene if other recovery tools were proving ineffective and complete termination was under consideration.
- *Addressing liquidity shortfalls.* The Bank's assessment is that arrangements for addressing a liquidity shortfall in ASX Clear (Futures) are appropriate. The Bank also considers that ASX Clear's arrangements for addressing a liquidity shortfall on cash equity positions are appropriate, and has obtained analysis from ASX to support its proposed use of complete termination as a last resort to address a residual liquidity shortfall on derivatives positions in ASX Clear. ASX's analysis demonstrates that the prospect of relying on complete termination is extremely remote.
- *Replenishment.* ASX's arrangements for replenishment would delay the return to a default fund that provided cover consistent with FSS requirements for at least 22 business days. Feedback from consultation suggested that more rapid (full) replenishment would not be possible for many participants. It is the Bank's view, however, that ASX should be able to return to regulatory minimum levels of default cover on a more rapid basis, consistent with the CPMI-IOSCO guidance that CCPs should have the capacity to return to full cover on a next-day basis if practicable.⁶⁶ This need not take the form of a committed fixed contribution, as would be the case for full replenishment, but could for instance be at least partly in the form of additional margin calls. While ASX has the capacity to call such margin, sole reliance on margin to cover stressed exposures could be highly procyclical. At the same time, in stressed market circumstances, participants might prefer to bear the liquidity cost of additional margin rather than face the risk of a loss on any additional contribution they might make to mutualised resources.

The Bank has signalled to ASX the need for further work on replenishment, in order to facilitate a more timely return to full cover while minimising the potential for procyclicality. There may be a range of approaches that could be used to meet these objectives in an achievable way. As part of this work, ASX will also need to satisfy the Bank that it has credible arrangements in place to fund its replenishment obligations in stressed circumstances. If not, an alternative *ex ante* default fund composition that relies less on ASX capital might need to be considered.

- *Non-default losses.* The arrangements for allocating investment losses are considered to be appropriate, provided that ASX implements plans to reduce its exposures to non-government investment counterparties and issuers (see Section 3.5.4). The reliance on insurance and

65 Payment haircutting would, however, more closely reflect the likely distribution of losses under insolvency (see Gibson M (2013), 'Recovery and Resolution of Central Counterparties', RBA *Bulletin*, December, pp 39–48 for discussion of the distribution of losses under each of these scenarios).

66 The guidance clarifies that practicability includes consideration of the potential procyclical impact of replenishment measures involving a call for additional financial resources from participants.

recapitalisation of the CS facilities' general business risk capital to address residual uncovered non-investment losses is also considered to be appropriate on the basis that (i) such residual losses would be expected to be extremely remote, and (ii) they would accrue gradually over time rather than arising on a short unanticipated timeframe.

Table 14 summarises the Bank's assessment of the ASX CCPs against the specific sub-standards of the FSS that address matters related to recovery planning, applying the rating system described in Section 2.2. Table 14 includes the Bank's recommendations and identifies areas in which the Bank will continue to monitor developments during the 2015/16 Assessment period.

Table 14: Ratings and Recommendations on Recovery-related Standards for ASX CCPs

Standard	Rating	Recommendation
<p>3.5. Preparation of recovery plans</p> <p>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.</p>	Observed	<p>ASX is encouraged to complete planned updates to the documentation of its recovery plans to take into account its expanded suite of recovery tools.</p> <p>ASX is encouraged to integrate testing and review of its recovery plan into its broader framework for testing and review of risk management and default management policies and processes. The Bank will monitor the outcomes from this testing and review process.</p>
<p>4.8. Loss allocation and replenishment</p> <p>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.</p>	Broadly observed	<p>In order to fully observe CCP Standard 4.8, ASX should complement its comprehensive loss allocation arrangements by further refining its replenishment arrangements to ensure that it is able to return to the full level of cover required under CCP Standard 4.4 on a more timely basis, while minimising the potential for procyclicality. ASX is also encouraged to test and review its capacity to replenish its own contribution to the CCP default funds.</p> <p>ASX is encouraged periodically to review its loss allocation arrangements, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.</p> <p>ASX is encouraged to carry out plans to develop additional disclosures to assist participants in understanding their contingent exposure to the use of loss allocation tools.</p>
<p>7.9. Addressing a liquidity shortfall</p> <p>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.</p>	Observed	<p>ASX is encouraged periodically to review its arrangements to address a liquidity shortfall, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.</p> <p>ASX is encouraged to carry out plans to develop additional disclosures to assist participants in understanding their contingent exposure to the use of tools to address a liquidity shortfall.</p>

Standard	Rating	Recommendation
<p>14.3. Addressing non-default losses</p> <p>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.</p>	Observed	ASX is encouraged periodically to review its arrangements to allocate investment-related losses, to ensure that these continue to strike an appropriate balance in terms of comprehensiveness, effectiveness, transparency and controllability, creating appropriate incentives and minimising negative impact.
<p>14.5. Recapitalisation</p> <p>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.</p>	Observed	ASX is encouraged to test and review its capacity to raise additional equity to replenish general business risk capital.

Table 15: Characteristics of the ASX CCPs' Recovery Approach

	Comprehensiveness	Effectiveness	Transparency and controllability	Creating appropriate incentives	Minimising negative impact
Loss allocation tools					
<i>ASX Clear</i>	Met via a combination of assessments and haircuts on complete termination. Assessments calibrated to cover two defaults in a 1-in-200 year event.	Met via next-day payment of assessments, which are calibrated based on participant activity. Failure to meet assessment obligations is an act of default. Legal basis founded in Operating Rules, approved as a netting market under the PSNA.	Met. Exposure to assessments and complete termination is fully transparent to participants.	Met. Avoiding <i>ex-ante</i> commitment to uncapped emergency assessments should reduce the risk that participants exit central clearing.	Met. Assessments distribute losses widely based on participant activity; complete termination triggered only in very extreme circumstances.
<i>ASX Clear (Futures)</i>	Met via a combination of assessments and uncapped payments haircutting. Haircuts on complete termination available to address any residual losses.	Met via next-day payment of assessments, which are calibrated based on participant positions. Payment haircuts have no performance risk. Legal basis founded in Operating Rules, approved as a netting market under the PSNA.	Met. Exposure to assessments and complete termination is fully transparent to participants. ASX intends to provide additional reporting on potential exposure to payment haircutting, which is controllable since it is based on participants' outstanding positions.	Met. Linking payment haircutting (which affects direct and indirect participants) and emergency assessments to the size of positions creates incentives for both clearing members and clients to manage exposures.	Met. Assessments distribute losses widely based on participant activity. Payment haircutting could transmit stress, but would be unlikely to trigger further defaults except in the most extreme cases. Complete termination would be triggered only if other tools prove ineffective.
Tools to re-establish a matched book					
<i>ASX Clear, ASX Clear (Futures)</i>	Met via a combination of partial and complete termination powers.	Met. ASX has the power to unilaterally force the settlement of open contracts to restore its matched book. Legal basis founded in Operating Rules, approved as a netting market under the PSNA.	Met. ASX proposes to apply partial termination on a pro rata basis, although an element of unpredictability will remain. Complete termination is fully transparent to participants.	Met. The threat of termination powers should provide incentives for participants to support default management processes. In respect of an over-the counter contract auction, uncertainty as to the impact of partial termination, or the threat of complete termination, may provide an incentive to bid competitively.	Met. The ability to partially terminate where feasible minimises the likelihood that complete termination will be required.

	Comprehensiveness	Effectiveness	Transparency and controllability	Creating appropriate incentives	Minimising negative impact
Tools to address a liquidity shortfall					
<i>ASX Clear</i>	Met via a combination of assessments and OTAs for securities, if prefunded resources and liquidity lines proved insufficient. Residual shortfalls would be met via complete termination.	Met. OTAs have no performance risk. Legal basis founded in Operating Rules, approved as a netting market under the PSNA.	Met. Exposure to OTAs is controllable since this is a position-based tool; however, the Bank is continuing to discuss with ASX how better to disclose the potential impact of OTAs to participants.	Met. OTAs are linked to the size of participant positions, albeit not with a one-to-one relationship.	Met. Obligations under OTAs would be calibrated to minimise the liquidity impact on participants in ASX Settlement's daily batch settlement process.
<i>ASX Clear (Futures)</i>	Met via a combination of assessments and payment haircutting, if prefunded resources proved insufficient.	Met. See discussion of assessments and payment haircutting under 'Loss allocation tools'			
Replenishment					
<i>ASX Clear,</i> <i>ASX Clear (Futures)</i>	Met. The proposals provide a path to return to full cover over time.	Further work required. There is delay of at least 22 business days in returning to full mutualised cover. Plans to raise additional ASX capital for timely replenishment may not be reliable in stressed conditions.	Met. Replenishment obligations are fully transparent to participants and may be avoided by resignation.	Further work required. Linking replenishment obligations to pre-default positions may create incentives to resign.	Further work required. The longer period for replenishment allows participants sufficient time to meet obligations; however, use of additional margin to manage risk in the interim could transmit liquidity stress.
Tools to address non-default losses					
<i>ASX Clear,</i> <i>ASX Clear (Futures)</i>	Met. The proposals fully address investment losses in excess of business risk capital; other non-investment general business losses would be met via insurance or recapitalisation.	Met. Investment loss allocations can be offset against collateral held at ASX. Legal basis founded in Operating Rules, approved as a netting market under the PSNA.	Met. Investment loss allocations proportional to cash posted as collateral.	Met. Investment loss allocations proportional to positions and provide incentives to monitor ASX's management of investment risks.	Met. Pro rata allocations spread the impact as widely as possible.

Abbreviations

ADI	authorised deposit-taking institution	CRA	Counterparty Risk Assessment
AFR	available financial resources	CRM	Clearing Risk Management
AIM	additional initial margin	CRO	Chief Risk Officer
AMO	Approved Market Operator	CROCC	CCP Risk, Operations and Compliance Committee
AONIA	Australian overnight index average	CRPC	Clearing Risk Policy Committee
APCA	Australian Payments Clearing Association	CRQ	Clearing Risk Quantification
APRA	Australian Prudential Regulation Authority	CS	clearing and settlement
ASIC	Australian Securities and Investments Commission	DBOR	Daily Beneficial Ownership Report
ASXCC	ASX Clearing Corporation	DCO	Derivatives Clearing Organization
BBSW	bank bill swap rate	DCS	Derivatives Clearing System
BCL	Banque Centrale du Luxembourg	DLR	default liquidity requirement
CALCO	Capital and Liquidity Committee	DMC	Default Management Committee
CBPL	capital-based position limit	DMF	Default Management Framework
CCMS	centralised collateral management service	DMG	Default Management Group
CCP	central counterparty	DMSG	Default Management Steering Group
CDI	CHESS Depository Interest	DPS	Derivatives Pricing System
CEO	Chief Executive Officer	DvD	delivery-versus-delivery
CFO	Chief Financial Officer	DvP	delivery-versus-payment
CFTC	US Commodity Futures Trading Commission	EMIR	<i>European Regulation on OTC derivatives, central counterparties and trade repositories</i>
CFR	Council of Financial Regulators	EPSC	Enterprise Portfolio Steering Committee
CHESS	Clearing House Electronic Sub-register System	ERMC	Enterprise Risk Management Committee
CMaX	Collateral Management Exchange	ESA	Exchange Settlement Account
CME	Chicago Mercantile Exchange	ESAS	Exchange Settlement Account System
CMM	cash market margining	ESMA	European Securities and Markets Authority
CPMI	Committee on Payments and Market Infrastructures	ETO	exchange-traded option
CPSS	Committee on Payment and Settlement Systems	FMI	financial market infrastructure

FSB	Financial Stability Board	PSNA	<i>Payment Systems and Netting Act 1998</i>
FSS	Financial Stability Standard(s)	PSR	price scanning range
GE	Group Executive	PvP	payment versus payment
HLE	High-level Expectation	RITS	Reserve Bank Information and Transfer System
HSVaR	Historical Simulation of Value at Risk	RQG	Risk Quantification Group
ICR	Internal Credit Rating	RTGS	real-time gross settlement
IOSCO	International Organization of Securities Commissions	SOF	Swift Oversight Forum
IRD	interest rate derivatives	SPAN	Standard Portfolio Analysis of Risk
IRS	interest rate swaps	SROCC	SSF Risk, Operations and Compliance Committee
NTA	net tangible assets	SRPC	Settlement Risk Policy Committee
OTA	offsetting transaction arrangement	SSF	securities settlement facility
OTC	over-the-counter	STEL	stress-test exposure limit
PFMI	<i>Principles for Financial Market Infrastructures</i>	SWIFT	Society for Worldwide Interbank Financial Telecommunication
PID	participant identifier	TAS	Trade Acceptance Service
PIRC	Participant Incident Response Committee	VaR	value at risk
PMO	Project Management Office	VSR	volatility scanning range

Appendix A: Detailed Assessment of Clearing and Settlement Facilities against the Financial Stability Standards

Introduction

This Appendix sets out the Reserve Bank's assessment of how well ASX Clear Pty Limited (ASX Clear) and ASX Clear (Futures) Pty Limited (ASX Clear (Futures)) have complied with the *Financial Stability Standards for Central Counterparties* (CCP Standards), and how well ASX Settlement Pty Limited (ASX Settlement) and Austraclear Limited (Austraclear) have complied with the *Financial Stability Standards for Securities Settlement Facilities* (SSF Standards) during the year to 30 June 2015 (the 2014/15 Assessment period).⁶⁷ In setting out its assessment, the Bank has applied the rating system used in the Committee on Payments and Market Infrastructures' (CPMI) and the Technical Committee of the International Organization of Securities Commissions' (IOSCO) *Principles for Financial Market Infrastructures: Disclosure framework and assessment methodology*.⁶⁸ Under this framework, the Bank has assessed each of the ASX Group (ASX) clearing and settlement (CS) facilities' observance of the requirements of each of the applicable CCP Standards or SSF Standards (together the FSS) as being:

- **Observed** – Any identified gaps and shortcomings are not issues of concern and are minor, manageable and of a nature that the facility could consider taking them up in the normal course of its business.
- **Broadly observed** – The assessment has identified one or more issues of concern that the facility should address and follow up on in a defined timeline.
- **Partly observed** – The assessment has identified one or more issues of concern that could become serious if not addressed promptly. The facility should accord a high priority to addressing these issues.
- **Not observed** – The assessment has identified one or more serious issues of concern that warrant immediate action. Therefore, the facility should accord the highest priority to addressing these issues.
- **Not applicable** – The standard does not apply to the type of facility being assessed because of the particular legal, institutional, structural or other characteristics of the facility.

Section 821A(aa) of the *Corporations Act 2001* requires that a CS facility licensee, to the extent reasonably practicable to do so, comply with the FSS and do all other things necessary to reduce systemic risk. In assessing how well a CS facility complies with a CCP or SSF standard, the Bank has

67 The full text of the detailed assessments of each of these CS facilities is available at <<http://www.rba.gov.au/payments-system/clearing-settlement/assessments/2014-2015/index.html>>.

68 Available at <<http://www.bis.org/cpmi/publ/d106.htm>>.

assessed how well the facility complies with the headline standard and each of the 'sub'-standards listed under the headline standard. A single overall rating is applied to each CCP or SSF Standard, reflecting this assessment.

Where a facility has been assessed to *observe* a CCP or SSF Standard, the Bank nevertheless expects ASX to work towards continual strengthening of its observance of the standard. ASX recognises this and has governance arrangements in place to motivate and encourage continuous improvement. This Appendix includes some recommendations encouraging such improvement in some specific areas. These are not exhaustive, and ASX is encouraged to continue to seek further improvements to its observance of the FSS over the coming Assessment period. This is in accordance with the general obligation on CS facilities to do all things necessary to reduce systemic risk.

Where a facility has been assessed to *broadly observe* a CCP or SSF Standard, the Bank will have sought evidence that a plan is in place to address the identified issue of concern within a clear, defined and reasonable time frame, and that it would not be reasonably practicable for the facility to take such actions immediately in order to fully observe the standard. This Appendix includes recommendations that identify the steps required by ASX to address the relevant issues of concern and fully observe the applicable CCP or SSF Standard.

The Bank's ratings of each of the CS facilities against relevant FSS are supplemented by detailed information under each sub-standard that is relevant to the Bank's assessment. The Bank gathered this information through its regular liaison with ASX staff, the supply of regular data and reports by ASX, and a series of specific information requests and meetings with ASX during and immediately following the Assessment period to gather information relevant to assessing compliance with the FSS. Arrangements for regular liaison and the supply of data and reports by ASX are described in further detail under the detailed assessments of CCP Standard 21 and SSF Standard 19.

Supplementary interpretation of CCP Standards

In assessing how well ASX Clear and ASX Clear (Futures) have observed certain sub-standards of the CCP Standards, the Bank has applied the supplementary interpretation of these sub-standards issued by way of an exchange of letters with ASX in October 2014.⁶⁹ This supplementary interpretation supersedes the Bank's previous supplementary interpretation of the CCP Standards issued in August 2013 (see Section 3.6). The supplementary interpretation of the CCP Standards applies to any domestically licensed derivatives CCP that provides services to participants that are either established in the EU or subject to EU bank capital regulations, and affects CCP Standards 2.6, 4.2, 4.4, 6.3, 7.3, 13.2, 13.3, 15.4 and 21.

69 The Bank's letter to ASX is available at <<http://www.rba.gov.au/payments-system/clearing-settlement/pdf/supplementary-guidance-domestic-derivatives-ccps.pdf>>.

Table 16: Supplementary Interpretation of the CCP Standards

CCP Standard	Additional Interpretation
<p>Governance</p> <p><u>CCP Standard 2.6.</u> 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 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.</p>	<p>The guidance to this CCP Standard, in 2.6.3, states that '...a central counterparty should have a risk committee responsible for advising the board on the central counterparty's overall current and future risk tolerance and strategy, or equivalent...'</p> <p>It is the Bank's judgement that, in accordance with the guidance, establishment of an independent risk committee is the most appropriate way to help the board discharge its risk-related responsibilities. The risk committee should comprise representatives of participants, and depending on the scale and nature of client clearing activity, also indirect participants. The Bank will interpret CCP Standard 2.6 accordingly in the case of ASX Clear (Futures) and ASX Clear.</p>
<p>Credit Risk</p> <p><u>CCP Standard 4.2.</u> 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.</p> <p><u>CCP Standard 4.4.</u> 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. 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...</p>	<p>The guidance in 4.2.4 discusses the role of prefunded financial resources in managing losses caused by participant defaults. The guidance recognises that the default waterfall may include '...a defaulter's initial margin, the defaulter's contribution to a prefunded default arrangement, a specified portion of the central counterparty's own funds, and other participants' contributions to a prefunded default arrangement.' The guidance does not prescribe a particular composition of prefunded financial resources, nor does it prescribe the order in which such funds should be drawn.</p> <p>Nevertheless, the Bank would expect that a material proportion of pooled financial resources comprised a central counterparty's own resources, and further, that a sufficient proportion of such resources would be drawn first in the event that a defaulting participant's margin and other contributions were exhausted, so as to ensure that the central counterparty faced appropriate incentives to set robust risk management standards. The Bank will interpret CCP Standard 4.2 accordingly in the case of ASX Clear (Futures) and ASX Clear.</p> <p>Separately, the guidance in 4.4.2, states that '...determinations of whether a central counterparty is systemically important in multiple jurisdictions should include consideration of, among other factors: the location of the central counterparty's participants; the aggregate volume and value of transactions that originate in each jurisdiction in which it operates; the proportion of its total volume and value of transactions that originate in each jurisdiction in which it operates; the range of currencies in which the instruments it clears are cleared or settled; any links it has with FMIs located in other jurisdictions; and the extent to which it clears instruments that are subject to mandatory clearing obligations in multiple jurisdictions...'</p> <p>In forming a judgement on systemic importance with reference to these factors, the Bank will take into account the (implicit or explicit) views of the relevant overseas regulatory authorities. The need to obtain recognition under EMIR – in order either to continue to provide services to clearing members established in the EU, or to be considered a 'qualifying CCP' under EU bank capital regulations – may be regarded as evidence that the EU authorities consider an Australian domestic central counterparty to be a possible vehicle for the transmission of risks to the EU. This may therefore be evidence of systemic importance in multiple jurisdictions.</p> <p>If a systemically important domestic central counterparty in Australia not only required recognition in the EU, but also had material participation of clearing members established in the EU and cleared a range of products, including derivatives with different characteristics (including levels of liquidity), the Bank would expect to conclude that such a central counterparty was systemically important in multiple jurisdictions.</p> <p>The Bank will interpret CCP Standard 4.4 accordingly in the case of ASX Clear (Futures) and ASX Clear and hold these central counterparties to the higher standard that they should maintain additional financial resources to</p>

CCP Standard	Additional Interpretation
<p>Margin</p> <p><u>CCP Standard 6.3.</u> ...Initial margin should meet an established single-tailed confidence interval of at least 99 per cent with respect to the estimated distribution 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 product cleared by the central counterparty...</p>	<p>cover the default of the largest two participants and their affiliates (by credit exposure).</p> <p>The guidance to this CCP Standard elaborates further. In particular, the guidance in paragraphs 6.3.1 – 6.3.3 requires that:</p> <ul style="list-style-type: none"> • ‘...the method selected by the central counterparty to estimate its potential future exposure should be capable of measuring and incorporating the effects of price volatility and other relevant product factors and portfolio effects over a close out period that reflects the market size and dynamics for each product cleared by the central counterparty...’ • ‘...close out periods should be set on a product-specific basis because less liquid products might require significantly longer close out periods...’ • ‘...a central counterparty should select an appropriate sample period for its margin model to calculate required margin for each product that it clears...’ • ‘...selection of the period should be carefully examined based on the theoretical properties of the margin model and empirical tests on these properties using historical data...’ <p>In interpreting CCP Standard 6.3 with reference to the guidance summarised above, a domestically licensed central counterparty that clears a range of products with varying degrees of liquidity and provides services to systemically important financial institutions headquartered in multiple jurisdictions would typically be expected to:</p> <ul style="list-style-type: none"> • apply a higher confidence interval, of at least 99.5 per cent, in relation to less liquid products, such as OTC derivatives, to reflect increased uncertainty around potential future exposure for products with such characteristics • use a close out assumption of at least five days for less liquid products, such as OTC derivatives, and the higher of a one or two day close out period for more liquid exchange-traded products • consider a range of sample periods to inform the calibration of margin requirements.
<p>Liquidity Risk</p> <p><u>CCP Standard 7.3.</u> 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... 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 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.</p>	<p>Consistent with the equivalent requirement in relation to credit risk, the Bank will, in determining whether a central counterparty is systemically important in multiple jurisdictions, take into account the (implicit or explicit) views of the relevant overseas regulatory authorities. The need to obtain recognition under EMIR – in order either to continue to provide services to clearing members established in the EU, or to be considered a ‘qualifying CCP’ under EU bank capital regulations – may be regarded as evidence that the EU authorities consider an Australian domestic central counterparty to be a possible vehicle for the transmission of risks to the EU. This may therefore be evidence of systemic importance in multiple jurisdictions. If a systemically important domestic central counterparty in Australia not only required recognition in the EU, but also had material participation of clearing members established in the EU and cleared a range of products, including derivatives with different characteristics (including levels of liquidity), the Bank would expect to conclude that such a central counterparty was systemically important in multiple jurisdictions.</p> <p>The Bank will interpret CCP Standard 7.3 accordingly in the case of ASX Clear (Futures) and ASX Clear, and hold these central counterparties to the higher standard that they should maintain additional liquid resources to cover liquidity needs in the event of 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.</p>

CCP Standard	Additional Interpretation
<p>Segregation and Portability</p> <p><u>CCP Standard 13.2.</u> 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.</p> <p><u>CCP Standard 13.3.</u> 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.</p>	<p>CCP Standards 13.2 and 13.3 do not explicitly require that a central counterparty offer the choice between individual and omnibus account structures. However, associated guidance (particularly 13.2.2-13.2.9) draws out the relevant considerations for a central counterparty in determining appropriate account structures. The guidance in 13.3.1 observes that 'in order to achieve a high likelihood of portability, a central counterparty will need to: have the ability to identify positions that belong to customers; identify and assert rights to related collateral held by or through the central counterparty; transfer positions and related collateral to one or more other participants...'. Where a central counterparty clears derivatives products for a variety of participant and underlying customer types, the Bank will interpret CCP Standards 13.2 and 13.3 as requiring that the central counterparty employ an account structure that enables its participants to offer their customers individual segregation. Accordingly, in relation to their clearing of derivatives products, ASX Clear (Futures) and ASX Clear will each be expected to make available to its participants an account structure that enables its participants to offer their customers an option that allows for separate identification and protection of individual customers' gross positions and collateral (or collateral value). To further protect derivatives customers, ASX Clear (Futures) and ASX Clear will each be expected to make available an account structure that enables excess customer collateral to be held directly with the central counterparty.</p>
<p>Custody and Investment Risks</p> <p><u>CCP Standard 15.4.</u> 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.</p>	<p>Although not explicitly stated in CCP Standard 15.4 or associated guidance (15.4.1), the Bank will interpret this requirement as applying in all market conditions, including in periods of market stress. Furthermore, since CCP Standard 15.4 also requires that a central counterparty's investment strategy should be 'consistent with its overall risk management strategy' and that 'investments should be secured by, or be claims on, high-quality obligors', and since the guidance (15.4.1) notes that investments should be subject to appropriate controls for wrong-way risk, the Bank would not consider investments in a central counterparty's own, or an affiliated entity's, securities, to be consistent with these requirements. The Bank will interpret CCP Standard 15.4 accordingly in the case of ASX Clear (Futures) and ASX Clear.</p>
<p>Regulatory Reporting</p> <p><u>CCP Standard 21.</u> 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.</p>	<p>CCP Standard 21 sets out a range of reporting requirements for central counterparties. The Bank is currently reviewing its regular information requirements and will inform ASX Clear (Futures) and ASX Clear accordingly. In the meantime, the Bank would like to clarify that in accordance with CCP Standard 21.1(i), which requires notification to the Bank if '...any internal audits or independent external reviews are undertaken of its operations, risk management processes or internal control mechanisms, including providing the conclusions of such audits or reviews', domestically licensed central counterparties such as ASX Clear (Futures) and ASX Clear will be expected to provide the Bank with copies of any reviews of their margin methodologies.</p>

ASX Group Structure

All four CS facilities are part of the ASX Group. In the ASX corporate structure, the two central counterparties (CCPs) – ASX Clear and ASX Clear (Futures) – are subsidiaries of ASX Clearing Corporation Limited (ASXCC), while the two securities settlement facilities (SSFs) – ASX Settlement and Austraclear – are subsidiaries of ASX Settlement Corporation Limited (Figure 1). ASXCC and ASX Settlement Corporation Limited are in turn subsidiaries of the ASX Group's parent entity, ASX Limited. ASX Limited is the licensed operator of the ASX market, while another subsidiary, Australian Securities Exchange Limited, is the licensed operator of the ASX 24 market. The ASX market

provides a trading platform for ASX listed securities and equity derivatives, while ASX 24 is an exchange for futures products. ASX Clear and ASX Settlement provide clearing and settlement services for the ASX market, and ASX Clear (Futures) provides clearing services for the ASX 24 market.⁷⁰

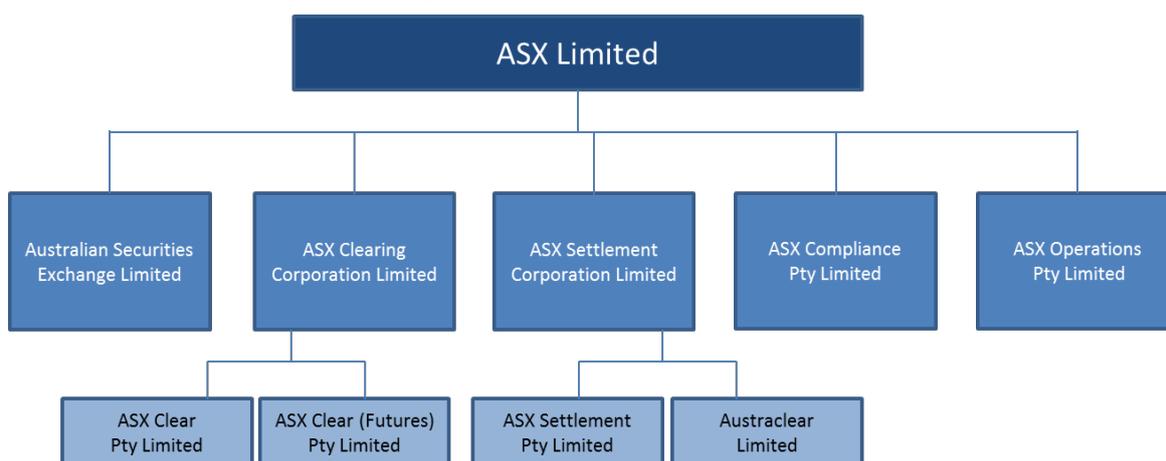
ASX Limited is a listed company. The ASX Limited Board is responsible for overseeing the processes for identifying significant risks to ASX and ensuring that appropriate policies, as well as adequate control, monitoring and reporting mechanisms, are in place. In addition, ASX Limited’s Board assigns certain responsibilities to subsidiaries within the group, including the boards of the four CS facilities (the CS Boards). The CS Boards are responsible for managing the particular clearing and settlement risks faced by each respective CS facility, including through compliance with the FSS. The CS Boards are subject to common governance arrangements with high-level objectives set out in the CS Boards’ Charter. A majority of the directors on the CS Boards are common to the boards of all four CS facilities; however, one of the directors on the ASX Clear and ASX Settlement Boards does not sit on the ASX Clear (Futures) and Austraclear Boards, and two of the directors on the ASX Clear (Futures) and Austraclear Boards do not sit on the ASX Clear and ASX Settlement Boards.

ASXCC is a wholly owned subsidiary of ASX Limited. ASXCC is the holding company for, and manages the financial resources of, the two CCPs. It invests these resources according to a treasury investment policy and investment mandate approved by the CS Boards.

The CS facilities rely in the delivery of their services on group-wide operational and compliance resources that reside in ASX Operations Pty Limited (ASX Operations), which is a wholly owned subsidiary of ASX Limited.

- ASX Operations provides most operational resources required by the CS facilities, including services to enable ASX Compliance Pty Limited (ASX Compliance) to perform its services.
- ASX Compliance provides compliance services to the licensed entities of the ASX Group, including monitoring and enforcing participants’ compliance with the Operating Rules of the CS facilities.

Figure 1: ASX Group Structure



⁷⁰ ASX Clear and ASX Settlement also provide clearing and settlement services for markets other than ASX; these are noted in Section 3.1.

ASX has adopted a group-wide organisational structure to manage the business operations of its various entities, including the CS facilities. Its business units are organised into nine main divisions:

- Office of the Chief Executive Officer (CEO)
- Risk
- Operations
- Technology
- Business Development
- ASX Compliance
- Office of General Counsel and Company Secretariat, Regulatory Policy and Regulatory Assurance
- Chief Financial Officer (CFO) Office
- Human Resources.

Risk contains a number of departments that play key roles in the management of risks faced by the CS facilities:

- Clearing Risk Policy – develops and maintains policies and standards related to CCP clearing risk management.
- Clearing Risk Quantification (CRQ) – maintains and validates CCP risk and pricing models.
- Clearing Risk Management (CRM) – implements CCP risk management policies and standards, and maintains effective procedures for carrying out those policies and standards.
- Risk Systems Development – responsible for the development of enhanced risk management systems.
- Enterprise Risk – responsible for enterprise-wide risk management, including general business risk.
- Portfolio Risk Management – responsible for managing investment and liquidity risks associated with ASXCC's investment portfolio.
- Internal Audit – conducts risk-based reviews of internal controls and procedures across ASX. Internal Audit reports to the Chief Risk Officer (CRO) for administrative purposes only.

ASX's Clearing Risk Policy Framework also sets out roles for a number of internal committees that bring together decision makers and experts from departments across the group:

- Clearing Risk Policy Committee (CRPC) – reviews policies and standards prior to CS Board submission.
- Capital and Liquidity Committee (CALCO) – advises on changes to clearing risk policies and standards related to capital, liquidity and balance sheet management.
- CCP Risk, Operations and Compliance Committee (CROCC) – discusses and shares information across relevant operational, compliance and risk management departments.
- Enterprise Risk Management Committee (ERMC) – reviews and approves enterprise risk management policy and related reporting prior to Board submission.

- Risk Quantification Group (RQG) – responsible for quantitative risk management matters, including review and approval of margin and stress-test model backtesting results and proposed model parameter changes.
- Participant Incident Response Committee (PIRC) – responsible for monitoring and managing material participant incidents and, in the case of a clearing participant, escalation of potential default events to the ASX Default Management Committee.
- Default Management Committee (DMC) – coordinates ASX’s response to a clearing participant default, and conducts the review and testing of the CCPs’ default management approach.

ASX’s Settlement Risk Policy Framework sets out roles for a number of additional internal committees:

- Settlement Risk Policy Committee (SRPC) – reviews policies and standards prior to CS Board submission.
- SSF Risk, Operations and Compliance Committee (SROCC) – discusses and shares information across relevant operational, compliance and risk management departments.
- Enterprise Risk Management Committee (ERMC) – reviews and approves enterprise risk management policy and related reporting prior to Board submission.
- Participant Incident Response Committee (PIRC) – responsible for monitoring and managing material participant incidents, including any non-compliance with capital obligations, settlement default, operational failure or an event which might result in the participant becoming an externally-administered body corporate or an insolvent under administration, and, in the case of a clearing participant, escalation of potential default events to the DMC.