



SWEDEN

FINANCIAL SECTOR ASSESSMENT PROGRAM

TECHNICAL NOTE—SUPERVISION AND OVERSIGHT OF FINANCIAL MARKET INFRASTRUCTURES

This Technical Note on Supervision and Oversight of Financial Market Infrastructures for Sweden was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed in November 2016.

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Prepared by
**Monetary and Capital Markets
Department**

This Technical Note was prepared in the context of an IMF Financial Sector Assessment Program (FSAP) mission to Sweden, led by Martin Čihák. It contains technical analysis and detailed information underpinning the FSAP's findings and recommendations. Further information on the FSAP can be found at <http://www.imf.org/external/np/fsap/fssa.aspx>

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Glossary

CCP	Central Counterparty
CLS	Continuous Linked Settlement
CMG	Crisis Management Group
CPMI	Committee on Payments and Market Infrastructures
CPSS	Committee on Payment and Settlement Systems
CSD	Central Securities Depository
CSP	Critical Service Provider
EMIR	European Market Infrastructure Regulation
ESMA	European Securities and Markets Authority
EU	European Union
FMI	Financial Market Infrastructure
FMID	Financial Market Infrastructure Directorate
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
IRD	Interest Rate Derivatives
MOU	Memorandum of Understanding
Nasdaq Clearing	Nasdaq Clearing AB
Nasdaq Group	The Nasdaq Group Inc.
Nasdaq Nordic	Nasdaq Nordic Ltd
NCA	National Competent Authority
PFMI	CPSS-IOSCO Principles for Financial Market Infrastructures
OTC	Over-the-Counter
RTGS	Real Time Gross Settlement
SSS	Securities Settlement System

EXECUTIVE SUMMARY

Financial market infrastructures (FMI) in Sweden are well developed, and subject to minimum regulatory requirements established in relevant international standards, the CPMI-IOSCO Principles for Financial Market Infrastructures (PFMI). Domestic critical FMIs include two payment systems (RIX, the Swedish RTGS payments system, and Bankgirot, a retail payments system); one CCP (Nasdaq Clearing); and one CSD and SSS (Euroclear Sweden). Several overseas-based FMIs are also important to financial stability in Sweden, including two CCPs (EuroCCP and LCH.Clearnet Ltd), CLS, a settlement system for foreign exchange transactions, and SWIFT, which provides network and message standards for financial transactions.

FMIs in Sweden are subject to appropriate and effective supervision and oversight by Finansinspektionen (FI) and Sveriges Riksbank (Riksbank). The scope, basis and objectives of each authorities' supervision and oversight are clearly defined and disclosed. There is evidence that the authorities' supervision and oversight has been effective in improving risk management practices at Swedish FMIs.

There is effective cooperation between FI and Riksbank in the supervision and oversight of FMIs. There is overlap in the supervision and oversight of FI and Riksbank, and arrangements have been established to facilitate cooperation. There is evidence that that the authorities speak with one voice where relevant. However, FI and Riksbank should consider clarifying how they would coordinate during a (non-resolution) crisis, possibly by establishing a joint crisis management plan. The Swedish authorities also participate in several cooperative oversight/supervision arrangements pertaining to both domestic and foreign FMIs.

Resourcing of the FMI oversight and supervision functions appears to be tight. FI and Riksbank are encouraged to continue to review the adequacy of resourcing for FMI oversight and supervision. Resourcing of the FMI supervision function at FI should be strengthened and resourcing of the FMI oversight function at Riksbank should be kept under review. While effective cooperation can help alleviate resourcing pressures, and the authorities have streamlined processes, there are potential pressures from international policy work and increasing demands on the authorities in other areas. In Sweden, Nasdaq Clearing clears complex products, and is one of few CCPs competing for growth in the clearing of OTC derivatives, and therefore warrants particular supervisory attention. It is likely that additional resources will also need to be devoted to work on FMI crisis management when EU legislation on CCP resolution is introduced.

Overall, risk management at Nasdaq Clearing appears to be sound. The elements of Nasdaq Clearing's risk management framework examined in this analysis are in almost all cases aligned with requirements in the PFMI. Since 2011, Nasdaq Clearing has made a number of significant changes to improve the safety and soundness of its operations. These changes have included, among other things: the legal separation of the CCP from the exchange business that was previously conducted within the same legal entity; the introduction of a waterfall of pre-funded resources; the introduction

of a new collateral management system; and the phasing out of bank guarantees not fully backed by collateral. The CCP was authorized under EMIR in 2014.

However, Nasdaq Clearing should make significant enhancements to its recovery plan. It is essential that CCPs have comprehensive and well developed recovery plans to ensure that they can continue to offer their critical services even in times of crisis. CCPs should also have the ability to comprehensively address credit losses and liquidity shortfalls. All recovery tools must be backed by formal agreements or in the rulebook, as appropriate. The need for further development has already been noted by FI and Riksbank, and Nasdaq Clearing has begun work in this area, in consultation with the authorities. A proposal for EU legislation in this area is expected to be presented in late 2016, which will provide additional certainty and ensure that enforcement powers are available for authorities.

Nasdaq Clearing should also continue to enhance its management of risks in certain other areas. This includes certain enhancements to its approach to credit and liquidity stress testing. In addition, the Board of Nasdaq Clearing should adopt objectives that explicitly support financial stability and other public interest considerations. Although there is no evidence to suggest that decision taking by the Board to date has delivered adverse financial stability outcomes, the adoption of an explicit objective would ensure that safety and financial stability are taken into account in future decision making including, where relevant, establishing standards beyond minimum regulatory requirements. More broadly, while its risk management framework generally appears to be sound, Nasdaq Clearing should ensure it stays on top of industry best practice as this continues to evolve.

Table 1. Sweden: Main Recommendations			
Supervision and oversight of FMIs	Timing	Authority	Paragraph
Resourcing of the FMI supervision function at FI should be strengthened and resourcing of the FMI oversight function at Riksbank should be kept under review.	Short term, ongoing	FI & Riksbank	28–29
FI and Riksbank should clarify how they would coordinate during a crisis, possibly by establishing a joint crisis management plan.	Short term	FI & Riksbank	34
18.19. Riksbank should consider extending its offering of central bank services to FMIs, in particular CCPs, to include access to collateralized overnight liquidity.	Medium term	Riksbank	19
Risk management of NASDAQ Clearing			
Nasdaq Clearing should make significant enhancements to its Recovery Plan. This should include ensuring that that its recovery tools are either supported in the Rules and Regulation or backed by formal agreements, as appropriate. <i>(This work is already underway.)</i>	Short term	Nasdaq Clearing	52–53, 63, 82, 84, 87, 88
Nasdaq Clearing should continue to refine its liquidity risk model.	Short–medium term	Nasdaq Clearing	81
The Board of Nasdaq Clearing should adopt objectives that explicitly support financial stability and other public interest considerations.	Short–medium term	Nasdaq Clearing	42
Nasdaq Clearing should review whether its use of a 99.9 percent confidence level to define ‘catastrophic’ events delivers sufficiently extreme outcomes in all cases.	Medium term	Nasdaq Clearing	72
Nasdaq Clearing should adopt a more conservative approach to the treatment of individual client segregated accounts in stress testing of its pre-funded default resources.	Medium term	Nasdaq Clearing	68
Nasdaq Clearing should consider whether there are options to replenish its prefunded default resources in a more timely manner.	Medium term	Nasdaq Clearing	65
Nasdaq Clearing should review whether all stakeholders that would be affected by an operational failover participate in business continuity tests, and should consider posing more stringent requirements regarding participation in these exercises.	Medium term	Nasdaq Clearing	91

Table 1. Sweden: Main Recommendations (concluded)

Nasdaq Clearing should consider whether there are additional areas of its stress testing framework in which interdependencies should be included. Nasdaq Clearing should also consider including the default of a clearing participant that plays multiple roles in a default management fire drill.	Medium term	Nasdaq Clearing	57
Nasdaq Clearing should consider introducing a more holistic approach to the management of pro-cyclicality, including by regularly assessing the effectiveness of its chosen tools.	Medium–long term	Nasdaq Clearing	54
Nasdaq Clearing should consider eliminating its credit exposure to its settlement banks, by extending the clearing participants' obligation until the funds are paid to the concentration bank.	Medium–long term	Nasdaq Clearing	59

INTRODUCTION¹

1. **The main objective of this note is to analyze the safety and stability of FMIs in Sweden.**² The note contains an assessment of the supervision and oversight of FMIs by relevant Swedish authorities. Effective supervision and oversight is a critical factor in ensuring that FMIs operate in a safe and sound manner, and that there is market confidence that FMIs will be able to continue to offer their critical services. The note also analyzes elements of the risk management framework of Nasdaq Clearing AB (Nasdaq Clearing), focusing on the safety and stability of the central counterparty (CCP).
2. **Well-functioning FMIs are crucial for the continued operation of the financial system.** FMIs facilitate the clearing and settlement of monetary and other financial transactions, including payments, securities and derivatives contracts. However, FMIs concentrate risks and so, if not properly managed, may be the source of systemic financial shocks, particularly during times of market stress. Due to the increasingly cross-border nature of FMI operations, particularly CCPs, such contagion may spread across jurisdictions. Recognizing the increasing systemic importance of FMIs, international standard setters have over recent years set more stringent regulatory requirements for these institutions.
3. **Recommendations in this note are based on the internationally agreed standards for FMIs, the CPSS-IOSCO Principles for Financial Market Infrastructures (PFMI), which were introduced in 2012.** The analysis of the supervision and oversight of FMIs takes the five Responsibilities for authorities of the PFMI as reference (Box 1), while the analysis of Nasdaq Clearing is based on relevant Principles in the PFMI. This note does not contain a comprehensive assessment of Nasdaq Clearing against the Principles, but rather focusses on selected issues and risks.
4. **The safety and stability of FMIs in Sweden and the oversight and supervision by the Swedish authorities has also been analyzed in other work.** CPMI and IOSCO have assessed the adoption of the PFMI and the Responsibilities by authorities in several jurisdictions, including Sweden. The results of this work are summarized in Appendix 1. The 2011 FSAP of Sweden also addressed oversight and supervision of FMIs, as well as the operation of the Nasdaq OMX DM (since restructured and renamed Nasdaq Clearing) and the RTGS payment system RIX. The results of this work are summarized in Appendix 6. Since the 2011 FSAP, new international standards and EU

¹ The note was prepared by Louise Carter (Reserve Bank of Australia), Consultant for the IMF. The analysis was based on publicly available information, self-assessments and other background documentation provided by the Swedish authorities and Nasdaq Clearing, as well as discussions with the authorities, Nasdaq Clearing, certain other Swedish FMIs and several participants and clients of Nasdaq Clearing.

² In this note, FMIs cover payment systems, securities settlement systems, central securities depositories, central counterparties and trade repositories. However, there are no trade repositories in Sweden.

legislation for FMIs have been introduced, and significant changes have been made to the operation of Nasdaq Clearing.

Box 1. PFMI Responsibility A–E

Responsibility A: Regulation, supervision, and oversight of FMIs

FMIs should be subject to appropriate and effective regulation, supervision, and oversight by a central bank, market regulator, or other relevant authority.

Responsibility B: Regulatory, supervisory, and oversight powers and resources

Central banks, market regulators, and other relevant authorities should have the powers and resources to carry out effectively their responsibilities in regulating, supervising, and overseeing FMIs.

Responsibility C: Disclosure of policies with respect to FMIs

Central banks, market regulators, and other relevant authorities should clearly define and disclose their regulatory, supervisory, and oversight policies with respect to FMIs.

Responsibility D: Application of the principles for FMIs

Central banks, market regulators, and other relevant authorities should adopt the CPSS-IOSCO Principles for financial market infrastructures and apply them consistently.

Responsibility E: Cooperation with other authorities

Central banks, market regulators, and other relevant authorities should cooperate with each other, both domestically and internationally, as appropriate, in promoting the safety and efficiency of FMIs.

Source: CPSS IOSCO Principles for Financial Market Infrastructures, April 2012.

DESCRIPTION OF FINANCIAL MARKET INFRASTRUCTURES IN SWEDEN

A. Overview of Financial Market Infrastructures in Sweden

5. There are four critical domestic FMIs operating in Sweden. This includes two payment systems: RIX, the Swedish RTGS payments system, which is owned and operated by Riksbank; and Bankgirotcentralen BGC AB (Bankgirot), a payments system which processes a wide range of retail payments including giro payments, direct debit payments, credit transfers, supplier payments from companies, account deposits of salaries and tax payments, as well as certain cash withdrawals and card payments. Bankgirot is owned by a group of Nordic banks. There is one domestic CCP, Nasdaq Clearing, which offers CCP clearing for exchange-traded financial and commodity derivatives, over-the-counter (OTC) interest rate derivatives (IRD) and repos (see paragraph 8). There is also one domestic central securities depository (CSD) and securities settlement system (SSS) for Swedish shares and fixed income securities, Euroclear Sweden. Euroclear Sweden is owned by Belgian group

Euroclear SA. There are currently no trade repositories in Sweden. See Appendices 2 and 3 for diagram of the Swedish FMI landscape and key statistics regarding Swedish FMIs.

6. Several FMIs located outside Sweden are also relevant for the Swedish financial system. EuroCCP, a Dutch CCP, clears certain equities and exchange-traded funds traded on the Nasdaq Stockholm stock exchange and the Swedish marketplace First North. LCH.Clearnet Ltd, a UK-based CCP, clears OTC IRD, including those denominated in Swedish Krona, as well as equities traded on Nasdaq Stockholm. The Continuous Linked Settlement system (CLS), the U.S. based settlement system for foreign exchange transactions, and SWIFT, which provides network and message standards for financial transactions, are also important in Sweden.

Overview of Nasdaq Clearing

7. Nasdaq Clearing is a 100 percent owned subsidiary of Nasdaq Nordic Limited (Nasdaq Nordic), itself ultimately wholly owned by Nasdaq Group. Nasdaq Clearing is one of a number of subsidiaries of Nasdaq Nordic, which also include several Nordic and Baltic exchanges and CSDs. The legal entity Nasdaq Clearing was created in September 2013, through the de-merger of the clearing and exchange businesses that were previously conducted within the same entity. Business other than clearing (i.e. markets, trading platforms and stock exchange operations) was transferred to a separate legal entity, Nasdaq Stockholm AB.

8. Nasdaq Clearing clears a range of products: equity derivatives (including exchange traded forwards, futures and options on single Swedish, Norwegian, Finnish and Danish stocks as well as options and futures on several indices); fixed income derivatives (including exchange traded and OTC derivatives and repos); and commodity derivatives (including on seafood, power, freight, oil, coal, renewables, gas, iron-ore). Nasdaq Clearing faces competition with other CCPs regarding the clearing of OTC IRD. The bulk of its business is in fixed income and equity derivatives. The bulk of clearing is denominated in SEK, although the CCP also clears products denominated in EUR, USD, DKK and NOK. See Appendix 3.

9. Nasdaq Clearing broadly organizes its clearing offering into two clearing ‘services’: financial derivatives; and commodity derivatives. As of end 2015, there were 46 participants in the financial service and 323 participants in the commodities service. Of these, 31 and 252, respectively, were foreign participants. Participation in clearing of OTC fixed income products, which is part of the financial service, is more concentrated, with only seven members. The two services are provided within the same legal entity of Nasdaq Clearing and are governed by the same policy framework.

B. Overview of the Supervisory and Oversight Framework

10. Finansinspektionen (FI) and Sveriges Riksbank (Riksbank) are responsible for supervision and oversight, respectively, of FMIs in Sweden. FI is responsible for authorizing firms to engage in clearing and settlement activities, including operating as a central counterparty. FI and Riksbank currently supervise and oversee: Nasdaq Clearing; Euroclear Sweden; and Bankgirot.

Riksbank also oversees RIX, the central-bank owned RTGS system. FI and Riksbank also participate in international cooperative oversight and supervision arrangements for overseas FMIs that operate in Sweden (EuroCCP, Euroclear Group, LCH.Clearnet Ltd, CLS, and SWIFT).

11. The regulation, supervision and oversight of FI and Riksbank are based on statutory law (see Appendix 4). FI's regulatory responsibilities are defined in the Securities Market Act (2007) and the Financial Instruments Accounts Act (1998). Riksbank's oversight responsibilities are based on the Sveriges Riksbank Act (1988) (see Appendix 4). EMIR is directly applicable in Sweden, which is of relevance for Nasdaq Clearing. FI is the national competent authority (NCA) for Nasdaq Clearing.

12. There is overlap in the responsibilities and objectives of FI and Riksbank's supervision and oversight of FMIs. Both authorities focus on stability of FMIs in their oversight and supervision. FI and Riksbank have both adopted the PFMI. FI and Riksbank seek to cooperate in their oversight and supervision of FMIs. This cooperation is supported by a MoU, also entered into with the Swedish National Debt office and the Government (through the Ministry of Finance). In practice, the authorities meet jointly with FMIs where relevant, and have a formal mechanism for cooperation at management levels.

ANALYSIS OF SUPERVISION AND OVERSIGHT

A. Regulation, Supervision and Transparency (Responsibilities A, C and D)

13. There are clear and publicly disclosed criteria governing which FMIs are subject to regulation, supervision and oversight by the Swedish authorities. Riksbank has published on its website the criteria used to identify FMIs that are subject to its oversight. These criteria are based on the importance of the FMI to the Swedish financial system and economy, and are closely linked to the criteria described in the PFMI. The scope of FI's supervision is determined in legislation.

14. FI and Riksbank supervise and oversee foreign FMIs that operate in Sweden by participating in cooperative supervision and oversight arrangements for those FMIs. The authorities in the home jurisdiction have primary responsibility for supervision and oversight of these FMIs.

15. FI and Riksbank publicly disclose their policies with respect to FMIs. The laws underlying each authority's oversight and supervision are publicly available. Riksbank has published an oversight policy that describes its role, objective and approach to overseeing FMIs. FI has published a supervisory strategy, which describes its approach across all its supervisory responsibilities, including FMIs. Both FI and Riksbank also publish, to different degrees of detail, information on their ongoing supervisory and oversight work, including their current priorities.

16. Both authorities have defined their objectives for their oversight and supervision of FMIs. Riksbank's objective is to identify and analyze sources of systemic risks and efficiency losses in the FMIs and act to reduce these in various ways. FI has broad objectives to promote stability in the financial system, consumer protection, efficiency and smoothly functioning markets. In its

supervisory strategy, FI states that its focus in supervising financial infrastructure is stability, and that it seeks to promote financially stable and operationally secure infrastructures.

17. FI and Riksbank have adopted the PFMI. Both authorities have published policy statements that they will apply the PFMI in their supervision and oversight. The PFMI forms the basis for Riksbank's oversight. Riksbank has stated that it may choose to impose more stringent requirements if required due to specific characteristics of the Swedish market. The focus of FI's supervision of CCPs is primarily on EMIR (as above, it is the NCA for Nasdaq Clearing); EMIR implements the Principles in the EU (see Appendix 1 and further discussion in paragraph 26). FI has stated that the PFMI may also serve as additional guidance if legislation is lacking or fails to give sufficient guidance.

18. The authorities apply the PFMI to all critical FMIs in Sweden. This includes RIX, which is owned, operated and overseen by Riksbank. Riksbank's oversight of RIX is conducted separately from the operation of the system, and there are conflict-of-interest and conflict management procedures in place. Riksbank applies the same oversight approach to RIX as it does to all other FMIs.

19. Riksbank should consider extending its offering of central bank services to FMIs, in particular CCPs, to include access to collateralized overnight liquidity. Currently FMIs may access certain central bank facilities, including intraday liquidity, but may not access overnight liquidity. FMIs play a systemically important role in the financial system, and distress at an FMI may have broader macroprudential implications for the system as a whole. Although in the normal course of business, FMIs should be able to manage their own liquidity requirements; in extreme market conditions dependence on commercial liquidity providers may not be reliable. Providing CCPs with access to collateralized overnight liquidity would ensure that the CCP can continue to make payments to counterparties and would thereby maintain the stability of the market. An ex-ante policy regarding access to such facilities may also provide confidence to the market regarding the ability of the CCP to continue its critical services during a crisis. Any such policy would be expected to take into account that the CCP is sound and observes relevant regulatory requirements.

20. There is evidence that FI and Riksbank's supervision and oversight has been effective in improving risk management practices at Swedish FMIs. The authorities engage regularly with FMIs, including through scheduled quarterly meetings with each FMI which (with the exception of the RIX system) both FI and Riksbank attend. More frequent meetings are held on particular topics, determined by the authorities' supervisory/oversight plans and/or by changes or events at an FMI. These meetings are either held jointly with both FI and Riksbank or separately, depending on the topic. The authorities also conduct deep dives into particular areas (e.g. cyber risk has been a recent area of focus). Oversight and supervision is also driven by changes planned by FMIs. There is evidence that FI and Riksbank engage constructively with FMIs where required regarding the interpretation of regulatory standards.

21. FI and Riksbank take a risk-based approach to supervision and oversight of FMIs.

Identified risks are prioritized based on the authorities' assessments of how likely they are to materialize and the consequences for financial stability. Both FI and Riksbank develop a supervisory or oversight plan each year using this risk-based approach; these plans can be amended throughout the year if required. Oversight and supervisory priorities are also driven by change at the FMIs; such changes are subject to review by FI and Riksbank. For CCPs, under EMIR, FI (in consultation with the EMIR College, which includes Riksbank) must approve material changes to a CCP's operations. Riksbank also indicated that over time it seeks to cover comprehensively all risks faced by the FMIs it oversees, and FI has an obligation to produce an annual risk-assessment regarding how Nasdaq Clearing meets all EMIR requirements (and a similar requirement is expected for CSDs under new EU legislation).

22. FI and Riksbank are currently making changes to elements of their oversight approach.

Under the current approach, a key input in FI and Riksbank's supervision and oversight of FMIs has been a requirement that the FMIs conduct self-assessments against the Principles at least every three years. The self-assessments must be produced in accordance with the PFMI self-assessment methodology. There are potential benefits from a self-assessment approach, in terms of resource commitments and that it encourages a FMI to consider and take some ownership of its observance of the minimum regulatory requirements. However, there are potentially misaligned incentives in relying on FMIs' self-assessments. FI and Riksbank gain comfort in the accuracy and comprehensiveness of the self-assessments by engaging in extensive dialogue with the FMIs throughout the process, and requiring the FMIs to provide detailed supporting evidence (such as policy and procedure documents, links to relevant rules) for all statements made in their self-assessments. FI and Riksbank are intending to move away from the self-assessment approach. For CCPs, under EMIR NCAs must conduct an annual risk-assessment of a CCP's observance of all EMIR requirements; a similar requirement will also apply to CSDs. This means that compliance with all legal requirements will be assessed by the authorities annually. This assessment is discussed by the relevant EU College. This is a relatively new requirement and FI is continuing to adapt its approach here. The authorities will continue to develop supervisory and oversight plans using the existing risk-based approach, with a view to focusing the use of resources. Under the new approach, FMIs will also be required to publish disclosure frameworks at least every two years, as required by the PFMI. As the authorities review their supervisory and oversight approaches, they are encouraged to adopt an approach that ensures that each critical FMI's observance of all regulatory requirements is assessed in depth at least periodically.

23. The authorities have the option to commission external consultants and/or temporary staff to assist in their supervision and oversight of FMIs.

This option is used 'as needed'; most recently consultants have been engaged to conduct an IT-review of a specific FMI; to conduct work on FMIs' cyber-security; and to validate certain internal risk models proposed by a particular FMI. FI also has internal specialist resources with expertise in risk models, which it uses to assess FMIs' quantitative models. With respect to critical service providers, FI and Riksbank expect FMIs they supervise and oversee to apply Annex F of the PFMI. FI and Riksbank should ensure that all FMIs have conducted such assessments on all of their critical service providers.

B. Powers and Resources (Responsibility B)

24. Both FI and Riksbank have powers to obtain information from the FMIs that are subject to their supervision and oversight. These powers are based in relevant laws (see Appendix 4). Both authorities are entitled to request information they believe necessary. FMIs are also required to provide FI and Riksbank with information regarding planned changes to their systems or operations, and other significant matters, as well as certain statistical information.

25. FI has the authority to induce change and enforce corrective action at supervised FMIs. FI may rely on moral suasion, but also has the power to issue a remark, a public warning, or an order that an FMI take certain actions. Remarks or public warnings may be accompanied by a fine. FI also has the power to withdraw the license of a supervised FMI.

26. Riksbank has no formal enforcement powers. Riksbank relies on moral suasion to induce change, which it conducts through dialogue with the FMI, as well as speeches and publications, including its annual Financial Infrastructure report. Perceived deficiencies with a specific FMI could also be discussed with FI (which has enforcement powers) or at the Financial Stability Council. Riksbank has stated that it has found this to be an effective mechanism for inducing change. Riksbank's role as emergency liquidity provider also sits behind its use of moral suasion.

27. There are areas of the PFMI that have not been implemented in Swedish law, and therefore cannot be formally enforced by FI. These gaps arise where the PFMI have not been fully implemented in EMIR. As identified in CPMI-IOSCO implementation monitoring work, they include requirements regarding recovery plans, the allocation of uncovered credit losses, and the replenishment of financial resources and liquidity resources that a CCP may employ during a stress event (Appendix 1). Implementation of EU legislation that covers these gaps will provide certainty for the market and ensure that enforcement powers are available for authorities. It is expected that this legislation will be proposed in late 2016.

28. Resourcing of the FMI supervision and oversight functions within FI and Riksbank appears to be tight. FI's Infrastructure Supervision Division employs seven staff; it is also supported by the Securities Law Division, the Market Analysis Division and the Market Monitoring Division. The Riksbank's Financial Infrastructure Division employs 11 staff. Both Divisions also have broader responsibilities, including domestic and international policy and standard-setting related work. The FI infrastructure supervision division also has responsibility for supervision of three exchanges and three specialized investment firms, and assists the securities law division with FMI authorizations and related matters. The Riksbank Financial Infrastructure Division conducts work on the retail payments market, which accounts for approximately 2.5 full time staff. Two members of the Division who are lawyers also support the work of other parts of the Financial Stability Department. FI's Infrastructure Supervision Division is structured so that there is one lead supervisor for each FMI. Riksbank's Financial Infrastructure Division is structured so that there is one lead overseer and one back-up for each FMI. There is evidence that staff are suitably experienced and knowledgeable regarding the relevant FMIs.

29. Resourcing of the FMI supervision function at FI should be strengthened and resourcing of the FMI oversight function at Riksbank should be kept under review. The potential that resourcing of these functions was insufficient was noted in a joint internal audit of FI and Riksbank's observance of the Responsibilities in PFMI, finalized in 2014. In response to that audit, both FI and Riksbank have assessed that their resourcing with respect to FMI supervision and oversight is sufficient. As noted above, the authorities have the option to commission external consultants and/or temporary staff to assist in their supervision and oversight of FMIs. The authorities also take a risk-based approach to supervision and oversight, so as to prioritize resource use, and have sought to streamline processes. It appears that cooperation between the authorities has also alleviated resource pressures. Nevertheless, there are increasing demands on supervisors and overseers of FMIs, including with regards to requirements on NCAs under EMIR to conduct annual assessments and support supervisory colleges. In Sweden, Nasdaq Clearing clears complex products, and is one of few CCPs competing for growth in the clearing of OTC derivatives, and therefore warrants particular supervisory attention. In addition, should unexpected events arise (e.g. unanticipated staff absences, or significant changes or events at a supervised FMI), it is not clear that there would be sufficient experienced resources available, without diverting resources that are required to conduct ongoing supervision (potentially regarding other FMIs). This appears to be particularly the case at FI, where there is only one dedicated supervisor per FMI. In addition, there is a potential for increasing pressures on the teams at both FI and Riksbank, particularly given their broader responsibilities. Where cross-team resources are relied on (or provided by the FMI teams to other areas), the authorities should be aware of the impact that increased pressures in other areas might have on the availability of these shared resources. Forthcoming work on FMI resolution will also have implications for the adequacy of resourcing.

C. Cooperation in Normal and Stressed Circumstances (Responsibility E)

Cooperative Oversight and Supervision

30. There is evidence that FI and Riksbank cooperate effectively regarding the supervision and oversight of Swedish FMIs. FI and Riksbank have a joint agreement on cooperation and information sharing, encapsulated in a broader MoU between the Ministry of Finance, Riksbank, FI and the Swedish National Debt Office. The agreement states the ambition of the authorities to assist each other and promote close cooperation, including regarding the collection and exchange of information. FI and Riksbank hold regular joint meetings with the domestic FMIs for which they both have responsibility. Regular meetings are held between the heads of departments from FI and Riksbank with primary responsibility for FMI matters, and working-level contact is ongoing. FI and Riksbank also coordinate as they develop their annual supervision and oversight plans. Feedback from industry suggests that the authorities 'speak with one voice' on matters pertaining to FMI oversight and supervision.

31. A supervisory college has been formed for Nasdaq Clearing, as required under EMIR. As the NCA, FI chairs the college; Riksbank is a member of the college, as are ESMA, the ECB and authorities from the U.K., Norway, Finland and Denmark. The role, processes and membership of the college are specified under EMIR; the college's role includes information sharing, coordination of

supervisory examinations and establishing contingency planning for crisis situations. FI is obliged to consult with the college on several matters pertaining to the operations of Nasdaq Clearing. The College meets at least once per year.

32. FI and/or Riksbank participate in cooperative oversight and supervision arrangements for each of the critical foreign FMIs that operate in Sweden. These cooperative arrangements provide for the exchange of information between authorities, including in times of crisis. A full list of cooperative agreements the authorities participate in with respect to FMIs is provided in Appendix 5.

Crisis Management

33. FI and Riksbank each have documented internal crisis management plans. Riksbank has a FMI specific crisis management manual describing, among other things, contact details for key internal and external stakeholders. Riksbank also maintains a manual regarding the actions that would be taken if an FMI were to request emergency liquidity assistance; this process is tested. FI has an internal crisis management manual covering all its supervisory responsibilities, which is also tested. In addition, the Ministry of Finance has initiated a project that will, among other things, clarify the powers of Riksbank with regards to participants in 'the central payment system' including with respect to operational crisis preparedness.

34. FI and Riksbank should clarify how they would coordinate during a crisis, possibly by establishing a joint crisis management plan. Although the MoU between the Ministry of Finance, Riksbank, FI and the Swedish National Debt Office covers crisis management, it does so at a very high level. No domestic FMI-specific crisis management arrangements have yet been developed between FI and Riksbank. Given the overlapping interests of the authorities, there would be benefit in the authorities agreeing how they would coordinate amongst themselves and also with the relevant FMI(s) during a crisis. Further work on crisis management will be required, likely involving additional authorities, when EU legislation on CCP resolution is introduced.

35. There are currently no specific regulations in Sweden or the EU regarding managing a FMI in severe distress. International work is being conducted on these matters; notably FSB work on CCP resolution, in which the Riksbank is participating. This work is expected to form the basis of an EU proposal for new regulations regarding the recovery and resolution of CCPs, which at present is expected to be proposed in late 2016. It is important that this legislation be introduced, so as to facilitate FMI resolution planning by authorities. At present, resolution of an FMI in Sweden would be within the prevailing bankruptcy legislation.

36. An emergency protocol has been established within the Nasdaq Clearing EMIR College. This is based on the ESMA template. EMIR requires that these crisis communication procedures must be tested annually. As the EU legislation on FMI resolution is implemented, the Swedish authorities should also consider whether a CMG is required for Nasdaq Clearing. Nasdaq Clearing's operations spread across jurisdictions (e.g. its participant base spread across jurisdictions; it also has access to services from several central banks), and so the Swedish authorities should

ensure there is appropriate engagement and communication with authorities in these jurisdictions when developing the resolution plan for the CCP.

ANALYSIS OF THE SAFETY OF NASDAQ CLEARING

A. Legal Risk

37. EU, Swedish and Norwegian legislation, together with the CCP's rules and regulations, form the legal basis for Nasdaq Clearing's activities. Nasdaq Clearing was authorized under EMIR in 2014 and is regulated by FI under EMIR and the Swedish Securities Market Act. It is also licensed by the Norwegian Ministry of Finance. Participants are required to sign membership agreements prior to accessing Nasdaq Clearing, under which they agree to the governing law and to be bound by the relevant rules and regulations.

38. Nasdaq Clearing operates two rulebooks, for clearing of financial derivatives and commodity derivatives respectively, which are governed by different laws. The rulebook for Nasdaq Financial is governed under Swedish law, and the rulebook for Nasdaq Commodities is governed under Norwegian law. Nasdaq Clearing has assessed that, due to the similarity of Swedish and Norwegian law, the different governing laws do not result in any material differences or legal risks. Nasdaq Clearing seeks to ensure the rulebooks are synchronized so that there are no material differences in the operation of the two markets.

39. Nasdaq Clearing manages legal risks arising from the cross-border nature of its business by seeking legal opinions prior to accepting participants or engaging in other business with entities in foreign jurisdictions. Nasdaq Clearing has assessed that the implementation of the Settlement Finality Directive and Collateral Directive into Swedish and Norwegian legislation has reduced many cross-border risks associated with settlement, netting and collateral. Nasdaq Clearing only establishes relationships with settlement and concentration banks and CSDs where these parties are domiciled in jurisdictions that have implemented relevant EU legislation.

B. Governance and Corporate Structure

40. Nasdaq Clearing conducts only clearing business. The legal entity was created in September 2013, separating the clearing and exchange businesses that were previously conducted within the same entity. The CCP now employs 64 staff. Nasdaq Clearing operates a Norwegian branch, Nasdaq Clearing Oslo. The branch has a primarily operational role.

41. The Board of Nasdaq Clearing (the Board) retains legal responsibility for all decisions related to Nasdaq Clearing, including compliance and risk matters. Any Nasdaq Group-wide or Nasdaq Nordic-level policies must be adopted by the Board before they would apply to Nasdaq Clearing; the Board is responsible for assessing whether such policies are appropriate for the CCP. The Board comprises six members, two of whom are independent. One member of the Nasdaq Clearing Board is also a member of the boards of the exchanges owned by Nasdaq Nordic; there is

no overlap between membership of the Board of Nasdaq Clearing and the Board of Nasdaq Nordic. In addition, Nasdaq Clearing receives services from several other companies within the Nasdaq Group; these services are governed by service level agreements (SLAs) (see paragraph 89).

42. The Board of Nasdaq Clearing should adopt objectives that explicitly support financial stability and other public interest considerations. Such an objective is implicit in the regulatory requirements Nasdaq Clearing seeks to observe (e.g. EMIR requires that CCPs should ‘provide clearing services honestly, fairly and professionally and in a manner so that public confidence is maintained’). Nevertheless, there would be benefit in the Board explicitly adopting an objective of supporting financial stability, in accordance with the Principles. Although there is no evidence to suggest that decision taking by the Board to date has delivered adverse financial stability outcomes, the adoption of such an objective would ensure that safety and financial stability are taken into account in future decision making and would support, where relevant, the establishment of standards beyond minimum regulatory requirements.

43. The Board defines the risk appetite of Nasdaq Clearing. The Board has adopted a ‘Clearing Risk Policy’, which identified clearing-specific risks, and a ‘Risk Mandate’, in which it defines the tolerance for these risks. For business and operational risks, the Board signs off on the outcomes of Nasdaq Clearing’s risk-self assessment. The Board adopts policies regarding management of various risks (including clearing risks and operational risk), adopts the internal audit plan, and is responsible for approving material amendments to the Rules and Regulations. The risk management and audit functions within Nasdaq Clearing have independent reporting lines to the Board.

44. The Board delegates certain responsibilities to the Clearing Risk Committee (CRC). The CRC is an internal committee, chaired by the Chief Risk Officer (CRO) and comprising the CEO, CTO, representatives from Treasury, Clearing Operations, Business units, and Group Risk management. The CRC has a formal mandate from the Board to decide on risk matters in accordance with the policies and risk mandate approved by the Board. Any risks outside the approved tolerance must be escalated to the Board. In the event that the CRO and CEO do not agree on a matter within the CRC, this would also be escalated to the Board. The CRC meets at least monthly, and often more frequently.

45. The Board has also established a Member Risk Committee (MRC), which has an advisory role regarding clearing risk management controls, models, policies and procedures. Risk issues of material impact are passed through the MRC for non-objection. Membership of the MRC includes clearing participants from the Financial and Commodities services, as well as clients. Members must have adequate expertise in financial services, risk management and clearing services. Members are appointed for a 24 month term. The MRC is chaired by an independent Board member and second independent Board member also sits on the MRC. The MRC receives reports from the risk management department similar to the information received by the Board; and reports directly to the Board. On relevant matters for which the Board has delegated authority to the CRC, the CRC is required to take the MRC’s advice into account before implementing changes. If the advice of the MRC was not taken, Nasdaq Clearing would be required to submit a letter of explanation to FI.

46. There is a possibility that conflicts of interest may arise in a risk committee that comprises clearing participants and clients. Although the committee's role is to advise the Board, the interests of members and clients may not be aligned with the objectives of the CCP. Nasdaq Clearing manages this issue by escalating any issues where there is disagreement between the CRC and the MRC to the Board. This two-layered approach ensures that there is balance in the advice received by the Board. The Board is the ultimate decision maker regarding the operation of the CCP.

47. The Board receives regular reports regarding the risks faced by the CCP. The report is distributed to the Board in advance and presented during the meeting. The same report is also largely presented to the Member Risk Committee (MRC, see below) and the independent board members report the conclusions back to the Board. Risks deemed to be critical are escalated to the Board, as are breaches of the defined risk tolerance.

Mechanisms for Considering Stakeholder Interests

48. There is evidence that Nasdaq Clearing holds open and constructive dialogue with stakeholders. Nasdaq Clearing has established mechanisms to consider stakeholder interests in relation to matters including the strategy and design of Nasdaq Clearing and the Rules and Regulations. These mechanisms include: the MRC; Clearing Councils and Forums; IT forums; and meetings with participants, customers and relevant industry associations. Nasdaq Clearing is obliged to consult with the Swedish Securities Dealers Association on changes to the Nasdaq Financial Rules and Regulations. All members have an opportunity to review and comment on such changes. There is no equivalent requirement on the commodities service; rule changes are posted on Nasdaq Clearing's website prior to implementation, giving members an opportunity to comment. Nasdaq Clearing also operates an 'OTC Advisory Board', which provides participants clearing these products with influence over the future development of the OTC service, as well as its default management process (see paragraph 74).

49. Sufficient transparency regarding a CCP's operations is necessary to facilitate stakeholder input. Nasdaq Clearing has published information in accordance with CPMI-IOSCO qualitative and quantitative disclosure requirements. Nasdaq Clearing also makes a wide range of other disclosures on its website, including, among other things, a summary of its back-testing and credit and liquidity stress testing results, the independent model validation reports for its margin, liquidity risk, credit risk and haircut models, an overview of the investment policy, a summary of its business continuity plan, and summaries of its default management strategies. Nasdaq Clearing should ensure all disclosures are up to date.

Model Testing and Validation

50. Nasdaq Clearing conducts regular model testing and validation, in accordance with regulatory requirements. Testing and validation are core components in the governance of a CCP's models. Nasdaq Clearing has adopted a Model Validation Policy, which has been approved by the Board. Risk models must be validated by an independent party on an annual basis. Significant changes to a model must also be independently validated and the results presented to the MRC for

non-objection prior to the changes being adopted. External validators will be changed at least every five years. Nasdaq Clearing also conducts internal validation and testing of key risk models. This includes back-testing and sensitivity analysis of margin models; formal monthly review of credit and liquidity stress testing results and analysis of stress scenarios, including sensitivity analysis; reverse stress testing of credit and liquidity resources; and a formal annual internal review of key models (including margin and stress testing).

51. Nasdaq Clearing has established processes to ensure that the outcomes of model validations and testing are adopted, where appropriate. The CRC is responsible for recommending which recommendations from internal and external validations should be taken forward. This is presented to the MRC for non-objection, and to the Board of Directors, and validations are also discussed with RB and FI. (EMIR requires that significant changes to models and parameters be validated by FI and ESMA, and be subject to a College opinion.) The actions list is taken forward by the risk management department and followed up on during the next annual review. The results of ongoing testing would be escalated more quickly if required.

C. Recovery and Wind-Down Planning

52. Nasdaq Clearing should make significant enhancements to its 'Recovery Plan' (RP). It is essential that CCPs have well developed recovery plans, to ensure that they can continue to operate their critical services in times of crisis. Nasdaq Clearing implemented a RP in 2013, which was updated in September 2015. The plan covers several scenarios that may trigger recovery, as well as the recovery tools that Nasdaq Clearing considers might be adopted in such an event. The need for the RP to be further enhanced has already been recognized by Nasdaq Clearing, FI and Riksbank. Nasdaq Clearing expects to introduce a revised version later in 2016. Specific areas for enhancement have already been discussed, and will continue to be discussed, among Nasdaq Clearing, FI and Riksbank, including related to how the plan observes the CPMI-IOSCO Recovery Guidance. Recovery planning is not currently an explicit requirement under EU legislation. It is expected that legislation on this matter will be proposed later in 2016.

53. There are several areas in which the RP should be enhanced. This paragraph highlights some of these areas, although is not comprehensive. Nasdaq Clearing should ensure that its recovery tools are either supported in the Rules and Regulation or backed by formal agreements, as appropriate. In particular, plans to raise additional capital from affiliated entities should be documented and approved by all relevant decision makers. This is necessary to ensure that the plan could be implemented effectively. Although Nasdaq Clearing notes the benefit of flexibility, where the plan involves allocation of losses to third parties (e.g. participants) as much certainty should be provided as possible, to manage incentives and to allow third parties to measure, manage and control their exposures. Given the interdependencies in Nasdaq Clearing's operations, in which third parties can play multiple roles (see paragraph 55), Nasdaq Clearing should also consider the likelihood of multiple recovery scenarios occurring at the same time. Nasdaq Clearing has indicated that it will consider such a scenario in its revised RP. In doing so, it should identify any overlap between the tools it would rely on in each individual scenario, and assess whether they would be

sufficient if multiple scenarios arose simultaneously. The RP will be discussed with the MRC; Nasdaq Clearing should also consider whether there would be benefit in sharing elements of the plan with its participants and their clients more broadly. Nasdaq Clearing should also further develop the ‘wind-down’ component of its RP. Further specific areas for development are discussed in relevant sections throughout this technical note.

D. Systemic Risk

Pro-cyclicality

54. Nasdaq Clearing has taken steps to manage pro-cyclicality in its margins and collateral haircuts. Tools used include: absolute floors on margin parameters; a ten-year look back period with a ‘conservative’ confidence; and a pro-cyclicality buffer (although Nasdaq Clearing does not have a formal framework for considering when the pro-cyclicality buffer might be used). Nasdaq Clearing does not conduct continued monitoring, validation or testing of the effectiveness of these tools. Nasdaq Clearing should consider introducing a more holistic approach to the management of pro-cyclicality, including by regularly assessing the effectiveness of its chosen tools. Nasdaq Clearing has indicated it is considering whether to adopt a new margin model; the approach to pro-cyclicality could be considered further once this has been determined.

55. Nasdaq Clearing includes external credit ratings in various aspects of its risk management framework, including eligibility criteria for collateral and for settlement banks. Minimum external ratings are only one input into Nasdaq Clearing’s due-diligence; other factors include the financials of the entity, affiliations to other Nasdaq Clearing counterparties, CSD spreads, and geographical locations (among others). Although the due diligence framework includes minimum ratings, Nasdaq Clearing appears cognizant of the risks associated with ‘hard’ eligibility criteria based on external ratings; it conducts ongoing monitoring and no action is automatically triggered should a minimum rating be breached (rather, it has discretion to take various actions in such an event).

Interdependencies

56. Nasdaq Clearing has exposures to a number of entities that play multiple roles within its clearing operations. Nasdaq Clearing relies on three Nordic banks as liquidity providers which are also clearing participants of Nasdaq Clearing. All GMRA providers are also clearing participants, and three GMRA providers are also liquidity providers. Some of Nasdaq Clearing’s investment counterparties are also clearing participants, and similarly the concentration bank for NOK is a clearing participant. There is no overlap between clearing participants and custodian banks.

57. The risks from these interdependencies have been recognized by Nasdaq Clearing, as well as FI and Riksbank. This is a consequence of the concentrated nature of the Nordic banking system. Nasdaq Clearing has stated that although it seeks to diversify its service providers, this must be balanced against the need to choose providers who can offer appropriate service in the main currencies that are relevant for the CCP. Nasdaq Clearing has established a ‘soft’ concentration limit

on its overall exposure to an institution. If risks are deemed unacceptable, the CRC would be responsible for choosing mitigating action; this would be reported to the MRC and the Board. The total risk posed by entities with multiple roles is reported to the Board of Nasdaq Clearing quarterly. Where a clearing participant acts as a liquidity provider, Nasdaq adds the committed liquidity amount to the stressed liquidity obligation of the clearing participant; otherwise multiple roles are not included in the stress testing. Nasdaq Clearing should consider whether there are other areas of its stress testing framework in which the interdependencies should be included; Nasdaq Clearing should also consider including the default of a clearing participant that plays multiple roles in a default management fire drill; although procedures are tested separately, combining these into a single drill may serve to identify, for example, any operational capacity constraints. Access by Nasdaq Clearing to central bank facilities including collateralized overnight central bank liquidity would also mitigate some of these interdependencies (see paragraph 19).

E. Credit Risk

58. Nasdaq Clearing has identified that it is exposed to credit risk from clearing participants, as well as other entities involved in its payment, clearing and settlement processes (including to settlement banks, nostro agents, issuers, investment counterparties and custodian banks). Nasdaq Clearing sets minimum criteria regarding the robustness of counterparties to which it will take exposures to, and conducts ongoing monitoring of both its exposures and the robustness of its counterparties. Nasdaq Clearing uses an internal risk-rating model for clearing participants; it relies on external ratings to determine which other entities it will accept exposures against (e.g. settlement and commercial concentration banks must have a minimum rating of A- (S&P) or A3 (Moody's). In the event that a firm approached the minimum rating, this would be highlighted to the CRC to determine the appropriate course of action. A clearing participant could be placed on a watch list, and may be subject to stricter intra-day exposure limits.

59. Nasdaq Clearing should consider eliminating its credit exposure to its settlement banks. There is a short period of time during which Nasdaq Clearing faces credit exposure to settlement banks. Commercial banks are used for the initial phase of settlement for all currencies, prior to concentration of funds at the concentration bank. A clearing participant's obligation to pay Nasdaq Clearing is extinguished when it has made its payment to the settlement bank; however, there is a possibility that the settlement bank may default in the period prior to the funds being swept into the relevant concentration bank. Nasdaq Clearing has streamlined processes to reduce the duration of this exposure. Nasdaq Clearing should consider removing this exposure by extending the clearing participant's obligation until the funds are paid to the concentration bank.

Financial Resources to Cover Credit Risk to Clearing Participants

60. Nasdaq Clearing covers its exposure to clearing participants using variation margin, and initial margin and other prefunded financial resources. There is at least daily exchange of variation and initial margin. Certain parameters in Nasdaq Clearing's initial margin methodology are set above minimum regulatory requirements; Nasdaq Clearing should continue to maintain a conservative approach both here and in other areas of its risk management despite potential competition in certain markets. Nasdaq Clearing conducts intra-day margin calculations each hour during the trading day, based on both position and price changes, and makes intra-day margin calls in the event that pre-defined credit limits are breached. Participants that are on the credit watch list are subject to lower intraday exposure limits. Additional margin is also collected on concentrated positions. Portfolio margining across products is permitted only where there is a demonstrated stable and high correlation. Nasdaq Clearing does not conduct portfolio margining between financial and commodity derivatives, or between seafood and other commodity derivatives.

61. The collateral that Nasdaq Clearing accepts from participants to cover margin and other requirements is in accordance with minimum regulatory standards. Collateral accepted by Nasdaq Clearing includes, among other things: cash, certain government bonds, certain covered bonds, and certain shares and exchange traded funds. Nasdaq Clearing sets haircuts using a 10 year look back period to a 99.9 percent confidence level, which it considers to be 'extreme but plausible' (see further discussion in paragraph 71).

62. Nasdaq Clearing seeks to ensure that its total prefunded financial resources are sufficient to cover the default of the two participants and their affiliates that would potentially cause the largest aggregate exposure for Nasdaq Clearing in extreme but plausible conditions (i.e. the 'Cover 2' standard), across each of the financials, commodities and seafood services. Nasdaq Clearing has established a default waterfall, comprising of a combination of Nasdaq Clearing's own capital and participant-funded default funds (three service specific funds, and one mutualized across all services). See Appendix 7 for further detail regarding Nasdaq Clearing's approach to margining and the composition of the default waterfall.

63. Under current arrangements there is not a clear arrangement for how default losses would be allocated beyond the default waterfall. If losses arising from a participant default exceeded the pre-funded resources, they would be allocated to 'assessments' from clearing participants (i.e. ex-post contributions) which are capped at 100 percent of each participant's contribution to each relevant service specific default fund. In the event that losses also exhaust the capped assessment power, under its current rules any further losses would either be absorbed into the capital buffer, or Nasdaq Clearing could seek capital from its parent, or it could exercise its rights under the rulebook to early termination of contracts. As noted above, Nasdaq Clearing is continuing to develop its RP. As part of this work, it should establish explicit rules and procedures that address fully any credit losses it may face as a result of default among its participants with respect to their obligations to the CCP. This should be done in consultation with participants, which Nasdaq Clearing has indicated it intends to do.

64. Nasdaq Clearing requires that resources utilized in the management of a default be replenished within 10 business days. This applies to both participant contributions as well as Nasdaq Clearing's capital. Nasdaq Clearing would replenish its capital contribution to the default fund using retained earnings in the CCP; and, if that was not sufficient, the buffer it holds in non-regulatory tangible capital (set to 33 percent of regulatory capital). If this were to prove insufficient (which Nasdaq Clearing deems to be unlikely), it would seek to replenish the capital with a contribution from its parent company (see paragraph 71).

65. Nasdaq Clearing should consider whether there are options to replenish its prefunded default resources in a more timely manner. During the current 10 day replenishment period, the value of Nasdaq Clearing's pre-funded resources may not meet the 'Cover 2' standard. The 10 day replenishment period was implemented to provide clearing members with sufficient time for internal processing; the same period is used when contributions to the default fund are revised quarterly. The CPMI-IOSCO report *Recovery of Financial Market Infrastructures* states that a CCP should have "the capacity to effect a replenishment as soon as practicable, including by the following business day"; but the approach to replenishment should also balance any potential adverse financial stability outcomes. International best practice in this area continues to develop. Additional international regulatory guidance may be provided on this point; Nasdaq Clearing should review its approach in light of this.

66. Nasdaq Clearing has defined an 'interim period' of 90 days following a replenishment, during which replenished funds would be put in a senior position in the default waterfall, 'above' the Assessment power. If another default were to occur during the interim period, remaining funds in the remaining funds in the 'original' waterfall would be used to absorb losses prior to the replenished funds. The objective of this is to preserve the original waterfall structure in the event of multiple defaults. When the interim period has elapsed, the replenished funds are placed in the 'junior' positions in the waterfall. A clearing participant's Assessment obligation is reduced by an amount equal to any replenished amount within the interim period.

Stress Testing

67. Nasdaq Clearing uses stress testing to determine the size of and test the adequacy of the service specific default funds and the total clearing capital. The 'Cover 2' amount, for example, is determined as the largest stress test loss (over margin) generated during the last twelve months, from two participant defaults on the same day using the same stress scenario. The value of the total clearing capital is set to give an excess of at least 100–200 MSEK above the twelve month high point (usually this buffer is funded through the senior capital). The values, including participants' contributions, are formally recalculated on a quarterly basis.

68. Nasdaq Clearing should take a more conservative approach to the treatment of individual client segregated accounts in stress testing. Nasdaq Clearing does not include exposure to clients with individually segregated accounts when estimating its exposure to a participant default. The estimated stressed exposure to a participant does include potential losses

from any affiliates and clients of the participant that use an omnibus account. However, individual client segregated accounts are aggregated and held separate from the clearing member, i.e. they are treated as a separate member. Excluding individual segregated accounts assumes that all such accounts would be ported in the event of the clearing participant's default. This assumption may not be sufficiently conservative. Nasdaq Clearing has indicated that it expects this issue to be covered in a forthcoming EMIR review; once this is clarified, Nasdaq Clearing should review its approach. International best practice in this area continues to develop. Additional international regulatory guidance may be provided on this point; Nasdaq Clearing should review its approach in light of this.

69. In the event that daily stress testing indicated that pre-funded resources were insufficient or lower internal limits were breached, the issue would be escalated internally.

There is no 'automatic response'; rather, it would be at the discretion of the CRC to propose a solution. Nasdaq Clearing has the right to call clearing participants for additional contributions between regular scheduled recalculations, but in most cases would seek to cover any deficit using its own capital. Any stress-test results that indicated a breach of the pre-funded resources would also be reported to the Board and FI.

70. Nasdaq Clearing uses hypothetical and historical scenarios in its stress testing. Stress testing is conducted using an internal model, Clearing Capital at Risk (CCaR). Stress testing is conducted daily, on an end-of-day basis. Hypothetical scenarios are simulations based on peak historical market movements, such as price volatility and shifts in market factors. Historical stress scenarios replicate historical extreme market events, on current portfolios. Nasdaq Clearing does not apply 'forward looking' scenarios (i.e. scenarios based on specific hypothetical events, but considers that these are sufficient caught in its existing hypothetical scenarios.

71. In setting its risk tolerance, the Board has defined a 99.9 percent confidence level as representing a 'catastrophic' or extreme but plausible event. In the context of stress testing, hypothetical scenarios are generated by estimating individual parameters to the 99.9 percentile market movement, and the combining them. This creates a 'diversification effect' that produces scenarios that are more extreme. For non-diversified portfolios this effect may not apply; Nasdaq Clearing relies on historical stress scenarios to cover such portfolios. Nasdaq Clearing also monitors participants' portfolios on a quarterly basis, to consider whether additional scenarios are required. Large concentrated portfolios would also attract an additional concentration charges.

72. Nasdaq Clearing should review whether its use of a 99.9 percent confidence level to define 'catastrophic' events delivers sufficiently extreme outcomes in all cases. There is evidence that the application of this tolerance in Nasdaq Clearing's credit stress testing framework does deliver 'extreme but plausible' outcomes (see paragraph 71). However, there are instances in its broader risk management framework where Nasdaq Clearing appears to rely on this tolerance to deliver extreme but plausible outcomes where such diversification may not occur. Nasdaq Clearing should review its risk management framework to assess whether, in such circumstances, there is a case for taking a more conservative risk tolerance.

Default Management

73. Nasdaq Clearing has established rules and procedures regarding how it would manage a participant default. The circumstances in which a participant is considered to be in default are stated in the Rules and Regulations. Decisions regarding declaration of default, the management of the default and communication regarding the default are made by the Default Committee. The objective of the default process is to close out and/or mitigate market risk of the defaulter's positions, while minimizing costs and expense to participant default funds and the CCP.

74. The default management process is tailored for each asset class. However, in the event of a default affecting multiple services all decisions would be made by the Default Committee. Participants that clear OTC IRD products are required to advise Nasdaq Clearing regarding the hedging strategy for the defaulting participant's portfolio (a rotating group of three participants would have this responsibility). Participants that clear OTC IRD are also invited, although not required, to bid in any auction of a defaulting participant's OTC IRD portfolio. To incentivize constructive participation, participants' behavior determines the amount of protection they receive when losses are allocated to the OTC loss-sharing pool. The default management commitment also specifies that participants must take part in regular default fire drills. The default management process for the OTC IRD products depends on the active participation of the OTC IRD participants. As the market for clearing OTC IRD evolves, participants' incentives may change and so this should be monitored to determine whether current arrangements would remain effective.

75. In the event of a participant default, customer collateral and accounts may be transferred to a back-up clearing member. Porting typically is the least disruptive method of handling customer positions during a default. Nasdaq Clearing states on its website that it is the responsibility of clients to find a back-up participant. Although a back-up participant is not required, Nasdaq Clearing notes on its website that this is likely to increase the probability of client positions being ported.

76. Nasdaq Clearing conducts regular default management fire-drills. Product specific default fire drills are conducted on a minimum on an annual basis. For the fixed income asset class, default fire drills are conducted semi-annually and participants that clear OTC IRD are required to take part. The fire drills test different close-out options (including auction of any OTC IRD positions), new products, and new processes. The results of fire drills are presented to the CRC, the MRC and the Board. Feedback is also sought from participants. Results feed back into the default management strategy. Nasdaq Clearing plans to run a fire-drill covering a default in both the commodities and the financial service later in 2016. It would be beneficial for Nasdaq Clearing to further expand the scope of its fire drills to test its ability to handle porting in the event of default of a large client clearer, and the default of a clearing participant that provides additional services to the CCP (e.g. that is also a settlement bank).

F. Liquidity Risk

77. Nasdaq Clearing’s liquidity risk framework recognizes that it faces liquidity risk from several sources. These include a participant default (liquidity needs associated with market movement and/or settlement amounts), operational problems in a settlement bank, delivery failures and return of cash collateral. Nasdaq Clearing has established a liquidity model to measure and monitor its stressed liquidity requirements that takes account of these sources of risk. Nasdaq Clearing seeks to hold sufficient qualifying liquid resources (QLR) in each currency to cover the single largest expected stressed liquidity need (including, but not limited to, the default of the participant and its affiliates and customers that would generate the largest liquidity exposure to the CCP). Nasdaq Clearing seeks to ensure that it has sufficient additional liquid resources in each currency to cover the additional liquidity requirement in the event the two largest exposures crystalize (including, but not limited to, the simultaneous default of the two largest participants with the largest liquidity exposure to the CCP). See Appendix 7 for further detail.

78. Nasdaq Clearing has diversity in its QLR. Its QLR include: committed liquidity lines; cash and cash equivalent (overnight repos, cash on own accounts including cash at central banks and overnight cash deposits); and government securities available to sell with pre-arranged GMRA. The balance of QLR differs across currencies. Nasdaq Clearing has committed liquidity lines with four commercial banks: three Nordic banks (with direct access to the Riksbank, and access to central banks in other relevant currencies); and a fourth international bank that also provides multicurrency committed liquidity. Nasdaq Clearing gains comfort that liquidity providers would be able to provide the required amount of liquidity in a crisis due to the committed nature of the facilities. The diversity of the composition of the pool of QLR also reduces reliance on the liquidity providers. Nonetheless, risks remain regarding the reliability of liquidity providers in times of stress, particularly with the concentrated Nordic banking system. Nasdaq Clearing should continue its ongoing work to expand its pool of providers outside Nordic banks.

79. Stress testing is used to estimate liquidity requirements due to market movements in the event of a member default. Liquidity needs are estimated based on current positions and market scenarios over one and two-day horizons. The stressed scenarios are a sub-set of those simulated for the CCaR model. As in the CCaR, a twelve month lookback period is used to determine the ‘high point’ (i.e. the highest stressed liquidity need).

80. Stressed liquidity needs from other sources of liquidity risk are estimated by scaling up the historical high point from the past 12 months. The scaling factor is linked roughly to Nasdaq Clearing’s 99.9 percent definition of ‘catastrophic’. Nasdaq Clearing considers that a simulation approach would be too complex, relative to the materiality of the risks. Nasdaq Clearing considers that a twelve month look-back period is appropriate since the risk drivers (trading patterns, volatility, product features, and settlement arrangements) change over time. Nonetheless, barring any structural changes, arrangements such as settlement bank agreements would typically be fairly stable; a longer look-back period would usually be considered for the purposes of stress testing based on historical scenarios.

81. Nasdaq Clearing should continue to refine its liquidity model. Nasdaq Clearing is currently conducting a review of the model. The review will seek to address the recommendations of the latest independent validation, including: use of consistent risk scenarios in stress testing (i.e. on the same day); extending the time horizon covered by the model (currently only two days); including collateral liquidation in the scenario simulation, and changing the priority order of committed liquidity facilities versus highly liquid bonds. This is a positive development; industry best practice regarding CCP's management of liquidity risk is continuing to evolve and Nasdaq Clearing should continue to refine its approach. As Nasdaq Clearing refines its liquidity model, it should also consider whether it should use the full CCaR scenario set in estimating default liquidity requirements (and provide justification if it believes this is not necessary), and re-assess the approach to estimating stressed liquidity needs from other sources (in particular the basis for the 25 percent scaling factor and whether the twelve month historical look-back is sufficient).

82. As part of its RP, Nasdaq Clearing should also further clarify and formalize its arrangements for comprehensively addressing an actual uncovered liquidity shortfall. Nasdaq Clearing's RP suggests that it currently has only a limited number of tools to address an actual liquidity shortfall, not all of which are certain to be available to the CCP. As discussed in paragraph 53, Nasdaq Clearing should ensure that its recovery tools are either supported in the Rules and Regulations, or backed by formal agreements, as appropriate.

G. General Business Risk

83. Nasdaq Clearing holds liquid net assets funded by equity to cover general business risks and orderly wind-down (as well as capital to cover operational and legal risk and investment risk). This capital is separate to capital that Nasdaq Clearing contributes to its default waterfall. The amount of capital held to cover general business risk is calculated in accordance with minimum requirements in EMIR, taking into account Nasdaq Clearing's risk profile and its estimated wind-down time. Specific business risks for Nasdaq Clearing include pricing or margin pressures, and decreases in cleared volumes in each market segment. Nasdaq Clearing is subject to competition in the clearing of OTC derivatives, and makes appropriately conservative assumptions in its business risk analysis regarding this service line. Nasdaq Clearing also holds a 33 percent buffer on top of its regulatory capital; this buffer can be used to meet capital shortfalls from a range of sources, including replenishing capital Nasdaq Clearing contributes to the default waterfall. Assets held to cover general business risk are invested according to Nasdaq Clearing's investment policy, in highly liquid securities denominated in Swedish Krona. Nasdaq Clearing is also covered by a Nasdaq Group 'Global Insurance Policy'.

84. In the event that Nasdaq Clearing needed to raise additional capital, Nasdaq Clearing would request this from its parent company. Approval would also be required from the Nasdaq Group CFO. This arrangement is not currently explicitly documented, although Nasdaq Clearing has stated that it plans to establish a formalized agreement in the context of its RP (see paragraph 53). Comprehensive documentation of the plan, along with formal approval by the Boards of Nasdaq Clearing and the relevant affiliated companies, will improve the reliability of the plan, and facilitate a

fuller understanding of any restrictions or limitations regarding its implementation. (Note that a different process would apply in the case that Nasdaq Clearing sought to replenish the capital that it contributes to the Clearing Capital; see paragraph 64.)

H. Custody and Investment Risks

85. Nasdaq Clearing seeks to hold assets provided by clearing participants to meet collateral requirements, or used by Nasdaq Clearing to support its capital requirements, at CSDs in accounts in Nasdaq Clearing's own name. Where this is not possible, Nasdaq Clearing holds assets with a commercial custodian. Custodians and CSDs must meet minimum requirements and are monitored by Nasdaq Clearing.

86. Nasdaq Clearing's stated objective when investing cash is to minimize credit, market, concentration and liquidity risks to ensure that funds can be realized with minimum impact of value and within a very short time frame. Investments are primarily made in direct purchases of government securities or investments collateralized with government securities. A smaller share of cash is held unsecured with commercial banks or central banks to accommodate operational requirements. Unsecured investments with commercial banks are limited to a maximum of 5 percent of the portfolio (on average over the month), as stipulated in EMIR. Investments with individual counterparties or categories of counterparty are subject to limits. Restrictions on investments are in place to prevent wrong-way risk, and a maximum maturity limit is in place. Cash is invested in the same currency that it was lodged in.

87. In the event that Nasdaq Clearing incurs an investment loss, the loss would be allocated to Nasdaq Clearing's capital. Investment losses that exceed available capital would be treated as a capital shortfall, and dealt with under the RP. Under current arrangements, Nasdaq Clearing would seek to use its 33% capital buffer to absorb losses. Nasdaq Clearing has stated that the value of the capital buffer is around the same as the limit for unsecured investments with individual counterparties rated AA- (lower rated counterparties have lower limits). Linking unsecured exposure limits to available capital is a sound way of ensuring that the CCP can absorb losses from such investments, should they arise. As discussed in paragraph 52, Nasdaq Clearing is continuing to develop its RP. As part of its work on recovery under a potential investment-loss scenario, Nasdaq Clearing should consider formalizing the alignment between investment limits and the capital buffer, for example through its investment policy. In doing so, it should consider whether it is appropriate to also limit unsecured investment with higher rated counterparties to available capital.

I. Operational Risk

88. Much of the IT infrastructure on which Nasdaq Clearing operates is provided by other companies within Nasdaq Group. The Nasdaq Group Risk Management, also provides support to the entities within Nasdaq Group on areas such as business continuity management, crisis management, enterprise risk management, physical security and travel security. However, responsibility for operational risk faced by Nasdaq Clearing rests with the Board, which has adopted policies regarding operational risk management, including business continuity plans, and regarding

the control and oversight of information security. The CEO, CRO and CTO of Nasdaq Clearing are responsible for ensuring that there are independent operational risk controls. Nasdaq Clearing's Clearing Operations unit has established controls in the day-to-day clearing and settlement processes to identify operational issues, including risks from settlement banks and CSDs.

89. Although intra-group outsourcing offers certain efficiencies, it is essential that a CCP ensure that these arrangements are robust and provide sufficient access to services including in times of extreme stress. The functions provided to Nasdaq Clearing by other Group companies (its 'critical service providers') are governed by SLAs. The SLAs include operational reliability objectives, such as service availability targets and capacity requirements. Nasdaq Clearing monitors performance against the agreed service levels through quantitative reporting, quarterly service reviews and an annual review of the SLAs. If adequate service is not provided, the matter would be escalated within the Group (to date there have not been any instances where this has been required). In the event that the Board of Nasdaq Clearing decided to take a different risk tolerance to the rest of Nasdaq Group, this would be operationalized through SLA (depending on the issue) and monitored by Nasdaq Clearing. Nasdaq Clearing is also represented in the Nasdaq Group crisis management team, which is responsible for coordinating activities among all entities in the Group. Nasdaq Clearing should consider including in its RP how it would continue its critical operations in the case of a crisis (including potential insolvency) at Nasdaq Group, in particular how it would ensure that staff and systems would continue to be available to Nasdaq Clearing.

90. Nasdaq Clearing has a two-hour recovery time objective for all business critical functions and processes. In the event of a crisis, operations could fail-over to a secondary site which operates on separate infrastructure. The secondary site is currently located around 20km away from the primary site. Both sites are staffed, although with different capacities (the primary site for Nasdaq Clearing's IT systems is its secondary site for staff). A system failover can be performed from the primary to the secondary site without any need for staff relocation. Nasdaq Nordic is currently relocating its primary data center which will result in further separation between the primary and secondary sites. Nasdaq Clearing is on the steering committee for this project.

91. Nasdaq Clearing should review whether all stakeholders that would be affected by a failover are participating in its business continuity tests. Nasdaq Nordic conducts annual disaster recovery tests that involve failover from the primary to the secondary site. Participants are invited to take part in this test, although this is not mandatory. During the October 2015 test, only five per cent of participants took part. This in part reflects the composition of the membership base and different access models (e.g. some participants connect to Nasdaq Clearing through the internet so are not affected by failover between sites, while others have connectivity to both sites on an ongoing basis). However, given the low participation rate, there is a risk that clearing participants that would be affected by a failover are not sufficiently prepared. This could have implications for how quickly critical services can resume fully servicing the market and may also create capacity issues within Nasdaq's participant support teams. During 2016, testing will be mandatory as Nasdaq Clearing moves its operations to a new primary site. However, for future years Nasdaq Clearing

should review this issue and should consider posing more stringent requirements regarding participation in these exercises.

92. Nasdaq Clearing also relies on critical infrastructure such as SWIFT. Nasdaq Clearing has business continuity plans regarding its critical infrastructure and has back-up arrangements in place.

93. Nasdaq Clearing has established policies procedures to monitor and manage cyber risk. The Board of Nasdaq Clearing has oversight of information security related issues. The CCP's work is conducted with the work of the broader Nasdaq Group, including through the Nasdaq Information Security Risk Committee, co-headed by the Nasdaq CIO and the CISO. Specialist staff within Nasdaq Group have been hired, and external consultants have also been used. Nasdaq Clearing staff and systems are subject to various testing regarding cyber vulnerabilities. Work in this area is ongoing; Nasdaq Clearing will be reviewing its SLAs to ensure that information security requirements are appropriately reflected; and internal controls are being benchmarked against the NIST standard. This is an evolving area and Nasdaq Clearing should ensure its controls and governance processes also continue to evolve so that it meets industry best practice.

J. Main Gaps Identified and Recommendations for Risk Management

94. Broadly, risk management at Nasdaq Clearing appears to be sound and comprehensive. The analysis in this note does not cover all areas of Nasdaq Clearing's risk management framework; however, those areas that have been covered are largely aligned with the requirements in the Principles.

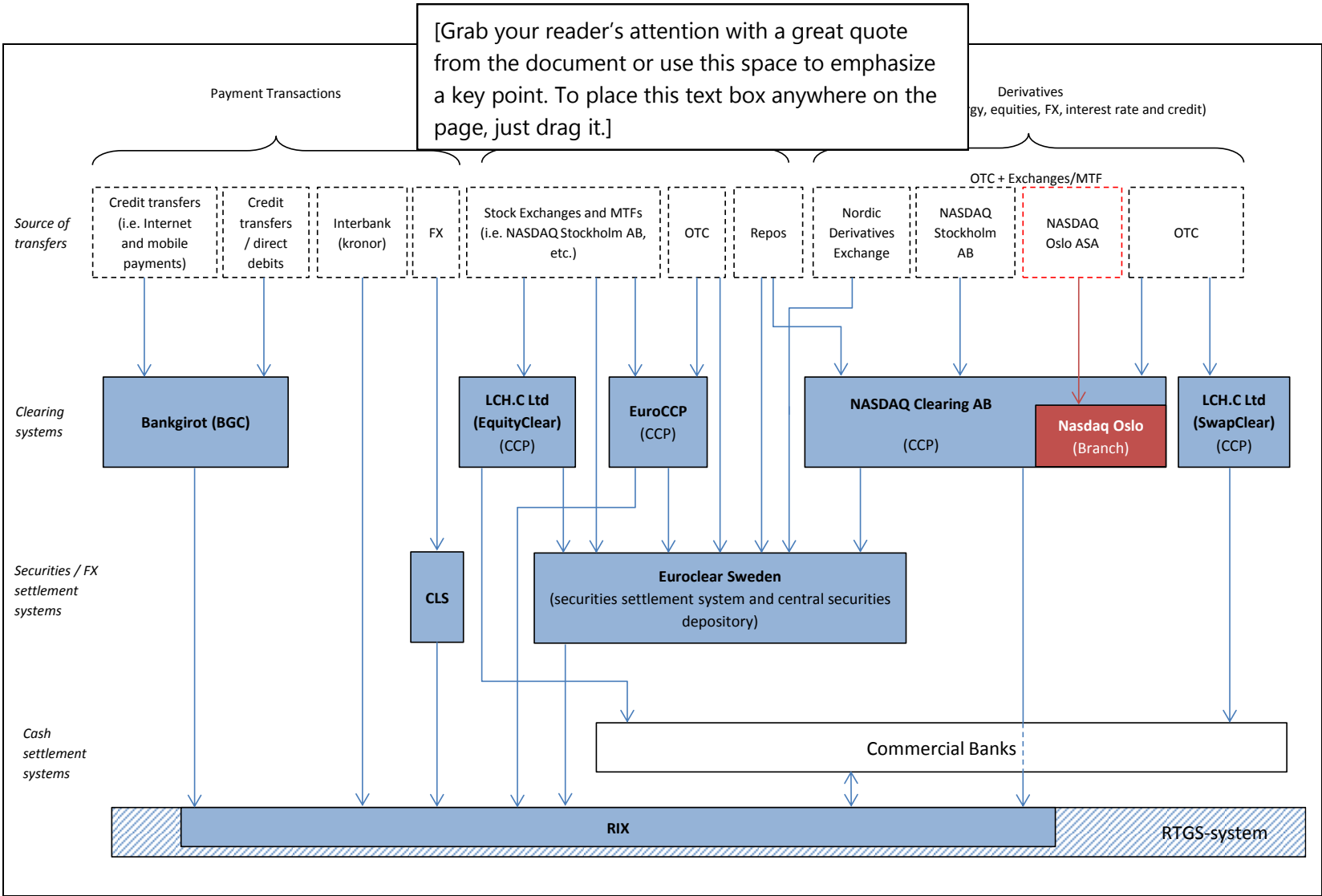
95. However, Nasdaq Clearing should make significant enhancements to its R P. The need for further development has already been recognized by the Swedish authorities and Nasdaq Clearing, and work is already underway. As part of this work, Nasdaq Clearing should clarify how it would comprehensively handle shortfalls arising from credit, liquidity and investment risks. All tools should be supported either in the Rules and Regulations or through formal agreements, where relevant. For Nasdaq Clearing, the latter is particularly relevant where it intends to rely on receiving additional capital from its parent entity. Appropriate documentation of this arrangement, which is approved by all relevant decision makers within Nasdaq Clearing and other relevant Nasdaq Group companies, will ensure that the plan could be implemented effectively.

96. There are some additional areas where further development or review is required. The recommendations for Nasdaq Clearing's approach to risk management are listed in Table 1. These include certain elements of the CCP's credit and liquidity stress testing models. Nasdaq Clearing should also adopt objectives that explicitly support financial stability and other public interest considerations. Although there is no evidence to suggest that decision taking to date has delivered adverse financial stability outcomes, the adoption of an explicit objective would ensure that safety and financial stability are taken into account in future decision making including, where relevant, establishing standards beyond minimum regulatory requirements.

97. More broadly, industry best practice and regulatory guidance regarding CCP risk management in several areas is continuing to evolve. Nasdaq Clearing should continue to review its risk management approach in line with these developments

Appendix I. CPMI-IOSCO Implementation Monitoring Assessment Results for Sweden

CPMI-IOSCO Implementation Monitoring Level	Assessment results	Publication
Level 1 - Assess whether a jurisdiction has completed the process of adopting the legislation and other policies that will enable it to implement the Principles and Responsibilities;	<p><u>Principles</u>: Highest rating of '4' for CCPs, PSs, CSDs and SSSs, and TRs, indicating that final implementation measures are in force.</p> <p><u>Responsibilities</u>: Highest rating of '4' for CCPs, PSs, CSDs and SSSs. Rating of N/A for implementation of Responsibilities for TRs (there are no TRs in Sweden, and ESMA is the sole supervisor of TRs established in the EU).</p>	CPMI-IOSCO 'Implementation monitoring of PFMI: Second update to Level 1 assessment report', June 2015
Level 2 - Assess whether the content of new legislation and policies is complete and consistent with the Principles;	<p>EU level assessment for CCPs and TRs. For CCPs, Sweden given highest rating of 'Consistent' for all Principles. (As above, there are no TRs in Sweden, and ESMA is the sole supervisor of TRs established in the EU.)</p> <p>Although some gaps and inconsistencies were identified between EMIR and its technical standards and the Principles (including requirements for ex-ante planning in areas such as recovery plans, allocation of uncovered credit losses, and replenishment of financial resources and liquidity resources), Swedish authorities have adopted policy statements that implement the PFMI as oversight and supervisory standards.</p>	CPMI-IOSCO 'Implementation monitoring of PFMI: Level 2 assessment report for central counterparties and trade repositories – European Union', February 2015
Level 2/3 - Assess whether the content of new legislation and policies are complete and consistent with the Responsibilities and implemented by the authorities	<p>Highest rating of 'Observed' for CCPs, CSDs and SSSs and PSs, indicating the authorities fulfil the Responsibility.</p> <p>Rating of 'Not Applicable' for TRs (as above, there are no TRs in Sweden, and ESMA is the sole supervisor of TRs established in the EU).</p>	CPMI-IOSCO 'Assessment and review of application of Responsibilities for authorities', November 2015
Source: CPMI-IOSCO Implementation monitoring publications.		



Appendix III. Basic Statistics on FMIs in Sweden

Table 1. Sweden: Key statistics in Sweden's FMI Landscape

	2014	2013	2012
RIX – volume of transactions (million)	4.06	3.81	3.62
RIX – value of transactions (SEK billion)	117,537	111,986	124,454
Bankgirot – volume of transactions (million)	903	850	808
Bankgirot – value of transactions (SEK billion)	9,394	9,044	8,667
Nasdaq Clearing – number of transactions (million)			
-Financials	11.69	10.20	10.09
-Commodities	0.19	0.14	0.16
Nasdaq Clearing – value of transactions (SEK billion)			
-Financials	28,699	37,821	41,393
-Commodities	490	484	500
Euroclear Sweden – number of delivery instructions (million)	14	13	11
Euroclear Sweden – value of delivery instructions (SEK billion)	85,305	92,946	93,580
Euroclear Sweden – value of securities held on accounts (SEK billion)	9,070	11,387	10,342

Source: CPMI Red Book (for RIX, Bankgirot and Euroclear Sweden); Nasdaq Clearing.

Table 2. Sweden: Nasdaq Clearing: Key Statistics 2015

	Members	Volume Daily average	Notional Value Daily average (SEK billions)
Financial Markets (total)	46 <i>Of which foreign: 31</i>	72,068.4	130.9
Equity derivatives <i>Of which: Exchange traded</i>		71,602.2	32.3 100%
Fixed income derivatives <i>Of which</i>		466.2	98.7
- Exchange traded			67.0%
- OTC – interest rate			1.4%
- OTC – repo			31.6%
Commodities	323 <i>Of which foreign: 252</i>	679.1	1.6
Commodity derivatives <i>Of which: Exchange traded</i>		674.5	1.6 100%
Seafood derivatives <i>Of which: Exchange traded</i>		4.6	0.02 100%

Source: Nasdaq Clearing.

Table 3. Sweden: Nasdaq Clearing: Currency Breakdown—Average Daily Value (Notional Value) in SEK Equivalent

Currency	Financial markets		Commodities	Seafood	Total (SEK)	Total (%)
	Equity	Fixed income				
SEK	32.3	95.0	0.0	-	127.3	96.0
EUR	-	-	1.3	-	1.3	1.0
USD	-	-	0.3	-	0.3	0.2
DKK	-	1.9	-	-	1.9	1.4
NOK	-	1.8	-	0.02	1.82	1.4
Total	32.3	98.7	1.6	0.02	132.62	100

Source: Nasdaq Clearing.

Appendix IV. Overview of Key Laws Applicable to Oversight and Supervision of FMIs

Law	Scope with respect to FMIs	Authority	FMIs
Securities Market Act (2007)	Contains provisions on investment services, markets for securities trading, and clearing and settlement of securities trading. Requires that firms conducting clearing operations not covered by EMIR or CSDR be authorized by FI. Contains provisions requiring FMIs to provide information to FI. Based on the Markets in Financial Instruments Directive (MiFID 2004/39/EC)	FI	Euroclear Sweden Bankgirot Nasdaq Clearing
Central Securities Depositories and Financial Instruments Accounts Act (1998)	Contains provisions complementing CSDR and on the registration of ownership of financial instruments. Requires that CSDs be authorized by FI.	FI	Euroclear Sweden
Financial Instruments Trading Act (1991)	Regulates collateral issues set out in the Financial Collateral Directive (2002/47/EC)	FI	Euroclear Sweden Nasdaq Clearing RIX Bankgirot
Sveriges Riksbank Act (1988)	Mandates that Riksbank has responsibility to promote a safe and efficient payments system. Contains provisions requiring FMIs to provide information to Riksbank. Establishes that Riksbank may make available systems for settlement of payments and in other ways participate in the settlement of payments, and may grant intraday credit to participants in the system against collateral.	Riksbank	Euroclear Sweden, Bankgirot. Nasdaq Clearing RIX
Settlement Systems Act (1999)	Provides for finality of settlement of payments. Based on the Settlement Finality Directive (1998/26/EC)	-	Euroclear Sweden Bankgirot Nasdaq Clearing RIX

Law	Scope with respect to FMIs	Authority	FMIs
Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories (EMIR)	Regulation of CCPs and TRs and of the clearing obligation within the EU. Establishes cooperative supervision colleges. Under EMIR, FI is the competent authority for Nasdaq Clearing	FI	Nasdaq Clearing
Regulation (EU) No 909/2014 of the European Parliament and of the Council of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories and amending Directives 98/26/EC and 2014/65/EU and Regulation (EU) No 236/2012 (CSDR)	Regulation of CSDs and SSS.	FI	(In the future: Euroclear Sweden)
Source: FI and Riksbank internal audit 2014; FMI websites.			

Appendix V. Swedish Authorities' Active National and International Cooperation Agreements Regarding FMI Oversight and Supervision

Agreement / FMI	Swedish authority	Type of arrangement
MoU between Government Offices, Sveriges Riksbank, FI and Swedish National Debt Office	FI and Riksbank	Multilateral MoU
Nasdaq Clearing College	FI and Riksbank	EMIR College – Chaired by FI
EuroCCP EMIR College	FI and Riksbank	EMIR College – Chaired by Central bank of the Netherlands
Euroclear Group	FI and Riksbank	Multilateral MoU – Led by National Bank of Belgium
LCH.Clearnet Ltd EMIR College	FI	EMIR college – Chaired by Bank of England
LCH.Clearnet Ltd Global College	Riksbank	College – Chaired by Bank of England
SWIFT Oversight Forum	Riksbank	Multilateral MoU – led by National Bank of Belgium
CLS Oversight Committee	Riksbank	Multilateral protocol – led by Federal Reserve Bank of New York
Source: Authorities' response to FSAP questionnaire; FI and Riksbank 2014 internal audit.		

Appendix VI. Responses to Recommendations of 2011 FSAP

Recommendation (paraphrased)	Response
1. Key recommendations	
Enhance NOMX DM's risk management procedures and separate financial resources between NOMX DM and NOMX COM.	There have been wide-ranging changes to Nasdaq Clearing's risk management procedures since 2011. See further detail below.
Review the relevant laws and regulations to address the legal uncertainty related to settlement finality and collateralization procedures.	Addressed by an amendment the Bankruptcy Act (SFS 1987:672). Although there is no explicit provision to regulate what applies in case of the bankruptcy of non-Swedish participants, the authorities have stated that this issue can be managed by the FMIs' own legal analysis when accepting non-Swedish participants.
Review its Act to allow Riksbank to issue regulations and formalize the division of responsibilities between Riksbank and FI.	A project on increased security in the central payments system in Sweden has been initiated. It intends among other thing to clarify the powers of the Riksbank regarding the actors within central payments system. Although there is no formal division of responsibilities between Riksbank and FI, cooperation arrangements exist aimed at achieving efficient cooperate where responsibilities overlap.
2. Other Recommendations from Assessments of Observance of CPSS Core Principles for Systemically Important Payment Systems and Assessment of Observance of CPSS-IOSCO Recommendations for Securities Settlement Systems and Central Counterparties	
Publish additional information on the Riksbank's oversight objectives and approach.	Riksbank has published an oversight approach statement on its website. Riksbank publishes an annual Financial Infrastructure report.
Formalize change assessments, and consider moving to somewhat lower frequency for the conduct of work-intensive full-scale assessments.	FI and Riksbank have adopted a risk based approach to supervision and oversight of FMIs.
In assessing market infrastructures against oversight standards, RB (and FI) should take more straightforward positions when areas of concern are identified, or in the event identified shortcomings would not be addressed within an appropriate period of time.	Riksbank has taken steps to improve the clarity of its positions, including through the publication of its annual Financial Infrastructure report.
Swedish authorities should: clarify with Norwegian authorities the exact sharing of responsibilities; and operationalize for clearing activities the 2010 MOU on cross border financial stability among MOF, central banks and FSAs in Nordic countries	EMIR has established FI as the NCA for Nasdaq Clearing. Norwegian and other Nordic authorities participate in the EMIR College for Nasdaq Clearing.

Swedish authorities should enhance their knowledge of activities conducted by NOMX COM, due to possible spillover effects on NOMX STO and notably NOMX DM.	The structure of Nasdaq Clearing has changed significantly since the 2011 FSAP. FI is the NCA for Nasdaq Clearing, which includes both the commodities and financial service.
Recommendation (paraphrased)	Response
2. Other Recommendations from Assessments of Observance of CPSS Core Principles for Systemically Important Payment Systems and Assessment of Observance of CPSS-IOSCO Recommendations for Securities Settlement Systems and Central Counterparties	
Swedish authorities should formalize the routines and procedures of their cooperation in order to increase exchange of information, to possibly share or allocate specific tasks among themselves, to enhance their common analysis capacity, and to gain efficiency benefits.	There is evidence of effective cooperation between the authorities. The authorities meet jointly with FMIs, there are regular meetings between the authorities at all levels, the authorities coordinate when setting their annual plans, and conduct joint work where appropriate.
Swedish authorities should strengthen their staffing resources with skills in quantitative analysis.	FI has dedicated staff with quantitative skills. Model validation is also conducted within the EMIR process, including through ESMA.
Consider implementing a business recovery requirement of two hours for RIX.	Addressed.
NOMX DM should set participation requirements for direct pledge end customers.	Participation requirements for direct pledge customers were implemented.
NOMX DM should not accept bank guarantees as collateral.	Bank guarantees not fully backed by collateral have been phased out as eligible collateral.
NOMX DM should overhaul the complete structure on which its regulatory capital is based and implement a more straightforward and fully-funded framework. Two totally ring-fenced capital bases for both NOMX DM and NOMX COM should be set up.	Nasdaq Clearing has pre-funded default resources to the 'Cover 2' standard. Nasdaq Clearing has introduced three separate member default funds for each clearing 'service'. At later stages in the default waterfall losses are mutualized across the services.
NOMX DM should raise the number of its liquidity providers (only two currently). NOMX DM should put in place the operational set up so that it can use, in case of needs, the intraday liquidity that may be provided by RB.	Nasdaq Clearing has increased the number of multicurrency liquidity lines to four: three with major Nordic banks and one with a bank outside the Nordic region. Nasdaq Clearing has access to intraday liquidity with the Riksbank
Swedish authorities should explore the possibility of legally separating clearing activities from trading activities currently being conducted within the same legal entity.	The clearing business has been separated from the exchange. Nasdaq Clearing conducts only clearing business.
NOMX DM should overhaul its current custodian arrangements and rely on CSDs.	Nasdaq Clearing has introduced a new collateral management system (CMS).
NOMX DM should analyse whether there is a need to strengthen its investment policy through restricting investment to the highest rated securities, for instance AAA securities as currently done in practice.	Nasdaq Clearing allows investments with lower credit rating than AAA, however imposes limits. regarding investments rated below AAA.

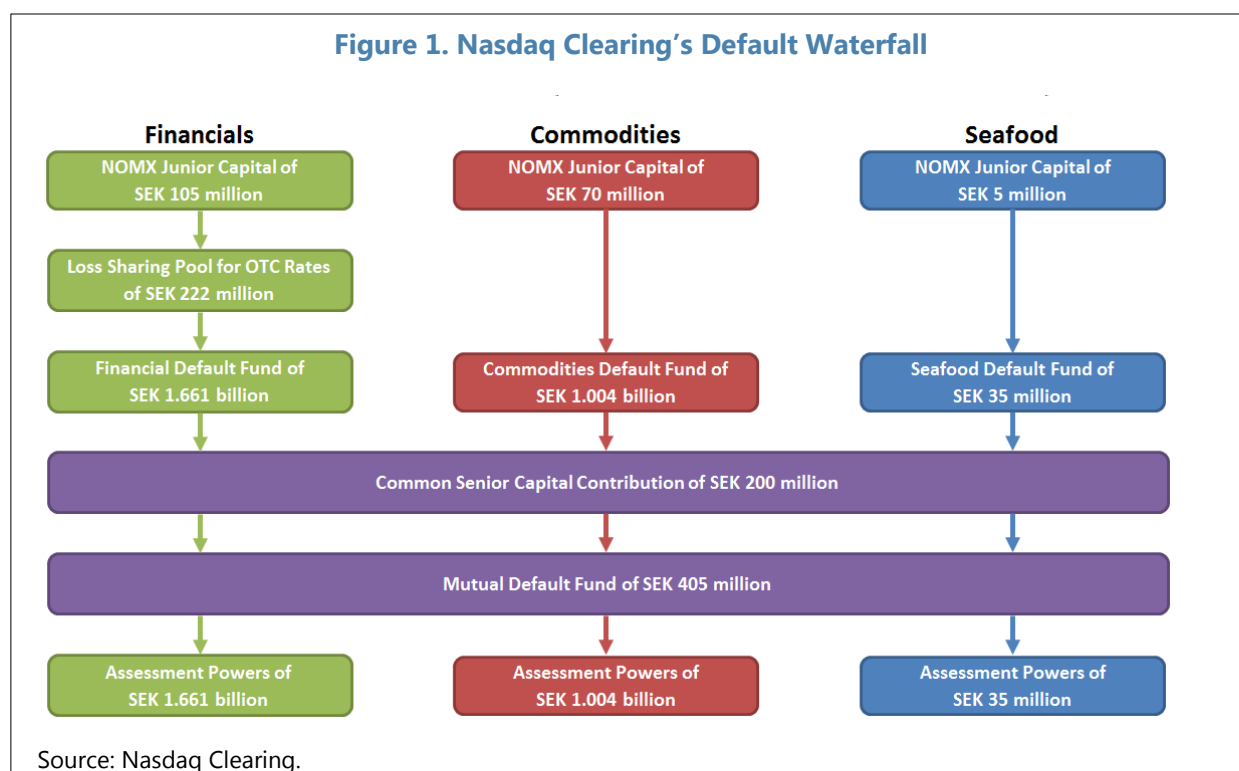
Recommendation (paraphrased)	Response
NOMX DM should enhance member's involvement in clearing activities through their adequate representation, for instance through a formal advisory committee.	Nasdaq Clearing has introduced a member risk committee, as required under EMIR, as well as other mechanisms for engaging with stakeholders.
Source: Sweden: Financial Sector Stability Assessment, July 2011, IMF Country Report No. 11/172, discussions with authorities	

Appendix VII. Elements of Nasdaq Clearing’s Credit and Liquidity Risk Management

A. Credit Risk

Margin

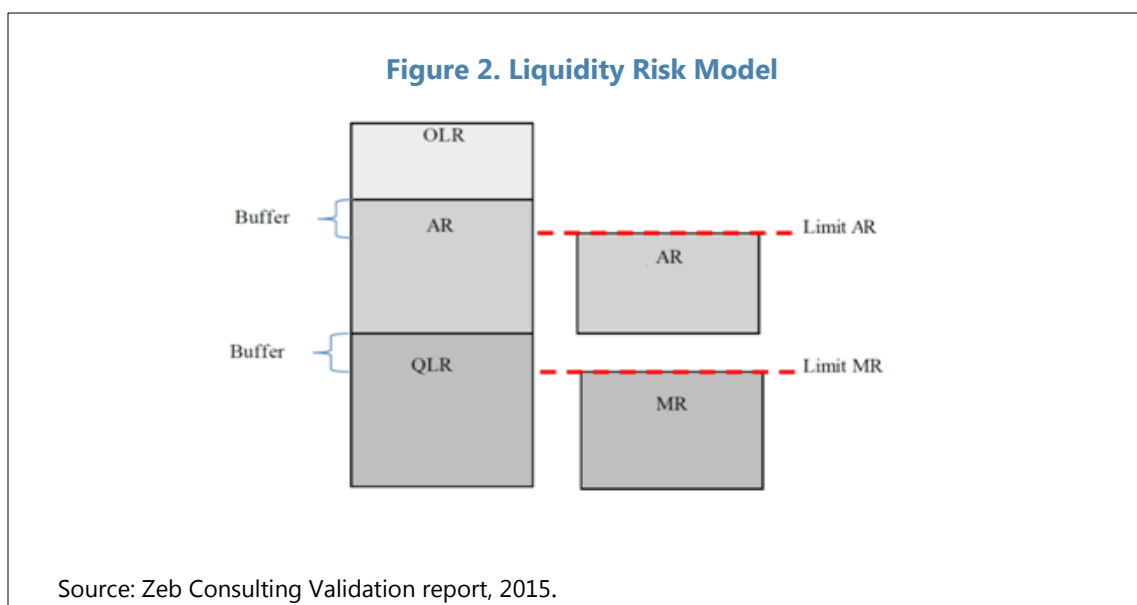
- At least daily variation margin
- Single tailed confidence level of at least 99.2 percent, depending on product.
- Minimum close out of two days for listed derivatives and five days for OTC derivatives
- Data period of 10 years (in the event that this is not available, a pro-cyclicality buffer is added)
- Intraday margin calls, covering both changes in positions and prices, are made in the event that pre-defined limits are breached
- Additional margin is collected on concentrated positions
- No portfolio margining between financial and commodity derivatives, or between seafood derivatives and other commodity derivatives
- Default waterfall for pre-funded and ex-post resources (Figure 1).



- **Junior capital contribution from Nasdaq Clearing (skin in the game): i.e. in the event that collateral lodged by the defaulting clearing participant(s) was insufficient to cover losses,** Nasdaq Clearing capital would be the first to absorb remaining losses. A separate amount is contributed for each of the three services; Nasdaq Clearing seeks to size this 'junior capital' contribution in accordance with requirements set out in EMIR: the junior capital must amount to at least 25 percent of 'Regulatory Capital' (as defined in EMIR); allocation across the services reflects the relative risk exposure in each market.
- **Service-specific pre-funded default funds, funded by participant contributions:** each service-specific default fund is sized to cover the large of the default of the largest participant, or second and third largest participants (including affiliates and clients) combined, in extreme but plausible scenarios. Each service-specific default fund is only available to cover default losses arising that that particular service. Participant contributions are based on their proportion of initial margin for particular service, averaged over three months, subject to a minimum amount.
- **Loss-sharing pool specific to OTC interest rate derivatives, funded by contributions from participants that clear OTC interest rate products: the purpose of the pool is to provide incentives for participants that clear OTC interest rate derivatives to assist Nasdaq Clearing in managing a default involving these products.** The loss-sharing pool would be used first (after the junior capital contribution) in such a default event. The size of pool is not taken into account when calculating the size of the default funds or total clearing capital.
- **Senior capital contribution from Nasdaq Clearing: this layer may absorb losses across all services.** It is sized to ensure that the total clearing capital will withstand the default of the two largest counterparties, across each service, in extreme but plausible market conditions (plus a buffer of around 100–200 million SEK. It is subject to a minimum value of SEK 100 million.
- **Mutualized default fund, which can be used to absorb losses in the event of the default of a participant from any of the three services (i.e. it is mutualized across each service).** Participants from each service contribute to the mutualized default fund. The value of contributions is set at 15 percent of each participant's contribution to the service specific default funds.
- **Assessments: in the event that the pre-funded default resources are insufficient to cover losses, Nasdaq Clearing has the right to call Assessments from non-defaulting clearing participants.** Assessments are capped at 100 percent of each participant's contribution to each relevant service specific default fund. Assessments are 'service specific', i.e. they may only be used to absorb losses in the relevant service.

B. Liquidity Risk

- Managed at the CCP as a whole (that is, not service-by-service)
- Assumes only daily cash settled products create liquidity pressures at default
- Two liquidity requirements—the ‘minimum requirement’ (MR) and the ‘additional requirement’ (AR)—based on estimated liquidity needs over a range of risk scenarios (Figure 2).
- MR: the single largest liquidity need across any of the identified risk scenarios over the previous 12 months; this includes the scenario where the participant (and its affiliates and customers) with the largest liquidity requirement for the CCP defaults in extreme but plausible conditions. Always includes liquidity needs from returning cash collateral.
- AR: the sum of the worst and second worst scenario; this includes the simultaneous default of two participants with the largest liquidity requirement for the CCP
- Nasdaq Clearing also maintains a liquidity buffer of 20 million SEK for stressed corporate needs.



- Liquidity needs estimated for each currency cleared and in total. The largest liquidity needs are in SEK: the majority of contracts and cash settlements are denominated in SEK.
- MR and AR are compared against available liquid resources.
- Qualifying liquid resources must exceed MR, with a buffer of 10 percent. QLR are subject to a diversification requirement—at least 50 percent of MR must be covered by cash and cash equivalent, and committed liquidity facilities.
- Additional liquid resources must exceed AR, with a buffer of 10 percent.
- Nasdaq Clearing also has intraday liquidity arrangements with all its settlement banks; these are not included in the QLR or ALR.