



European Securities and
Markets Authority

Final report

Possible systemic risk and cost implications of interoperability arrangements



Table of Contents

1	Executive Summary	4
2	Introduction	5
3	General overview	7
3.1	Current status.....	7
3.1.1	Concept and definition.....	7
3.1.2	Regulatory framework	8
3.1.3	Current status of EU links.....	11
3.2	Benefits.....	12
3.2.1	Broader access	12
3.2.2	Netting efficiency.....	13
3.3	Impact on costs	13
3.3.1	For CCPs	13
3.3.2	For clearing members (through to their clients)	14
4	Impact on risks at individual CCP level and assessment of risk-management systems and models.....	17
4.1	Inter-CCP credit risk.....	17
4.1.1	Qualitative analysis	17
4.1.2	Quantitative assessment of existing CCP links.....	25
4.3	Operational risk	28
5	Conclusion	29
6	Annex: Table of illustrations of main current EU interoperable links.....	30



Acronyms used

CCP	Central Counterparty
CPMI	Committee on Payments and Market Infrastructures (previously Committee on Payment and Settlement - CPSS)
EMIR	European Market Infrastructure Regulation – Regulation (EU) 648/2012 of the European Parliament and Council on OTC derivatives, central counterparties and trade repositories
ESMA	The European Markets and Securities Authority
ESRB	European Systemic Risk Board
ETD	Exchange Traded Derivatives
IOSCO	International Organization of Securities Commissions
OTC	Over the Counter
EC	European Commission
EU	The European Union
FMI	Financial Market Infrastructure
ITS	Implementing Technical Standards
MiFID	The Markets in Financial Instruments Directive (2004/39/EC)
NCA	National Competent Authority
PFMIs	Principles for Financial market Infrastructures published by CPMI-IOSCO in April 2012
Q&A	Questions and answers
RTS	Regulatory Technical Standards
RTS on CCPs	Commission Delegated Regulation (EU) No 153/2013

1 Executive Summary

Reasons for publication

The European Securities and Markets Authority (ESMA) is publishing this report pursuant to Article 85(4) of Regulation (EU) 648/2012 of the European Parliament and Council on OTC derivatives, central counterparties and trade repositories (EMIR) which provides that the European Commission (EC) shall, in cooperation with the Member States and ESMA, and after requesting the assessment of the ESRB, draw-up an annual report assessing any possible systemic risk and cost implications of interoperability arrangements focussing at least on the number and complexities of the arrangements and the adequacy of risk management systems and models. This report is also to be submitted to the Council and the Parliament.

Content

First this report details how the concept of interoperability has emerged in the EU and the general EU regulatory framework applicable to it as described in Title V of EMIR and in the Guidelines and Recommendations for establishing consistent, efficient and effective assessments of interoperability arrangements¹ (the Guidelines and Recommendations).

Then it provides a mapping and a description of the current interoperability arrangements between EU CCPs for different product types i.e. EU equities, EU government bonds and EU Exchange Traded Derivatives (ETDs).

Further an assessment of the benefits and impacts on costs for the relevant parties is included. Finally the last section is dedicated to the prudential analysis at CCP level and the risk management tools used to mitigate the potential risks arising from interoperability, including some quantitative data. The key risk under consideration is the counterparty credit risk resulting from exposures between interoperable CCPs. Whilst there are scenarios under which under-collateralisation can materialise, EMIR and ESMA Guidelines and Recommendations address how these cases should be catered for via inter-CCP arrangements. Along those lines, the evidence collected on the current CCP practices show that EU CCPs have set-up mechanisms to adequately mitigate potential risk of under-collateralisation, even in cases where re-use is permitted.

Next steps

This report is being submitted to the EC and is expected to feed into the report on any possible systemic risk and cost implications of interoperability arrangements that the European Commission shall prepare and submit to the European Parliament and the Council.

¹ https://www.esma.europa.eu/sites/default/files/library/2015/11/2013-323_annex_1_esma_final_report_on_guidelines_on_interoperability.pdf

2 Introduction

1. Under Article 85(4) of EMIR, the European Commission (EC) shall, in cooperation with the Member States and ESMA, and after requesting the assessment of the ESRB, draw-up an annual report assessing any possible systemic risk and cost implications of interoperability arrangements focussing at least on the number and complexities of the arrangements and the adequacy of risk management systems and models.
2. The ESRB has provided its assessment in a report published on 20 January 2016², focussing on the macro prudential implications of interoperability and a general assessment of the benefits and risks that CCPs' links can provide in the EU in terms of financial stability from a macro level perspective.
3. Now that all interoperability arrangements in the scope of EMIR involving an EU CCP have been approved according to Article 54 of EMIR, the EC has requested that ESMA provides its input to the above-mentioned report by 29 February 2016. For this purpose ESMA is publishing this report.
4. The analysis focusses on interoperability agreements for transferable securities and money market instruments, which are explicitly covered by the EMIR provisions on interoperability. Derivatives are only covered in Section 3.1.3.3, which provides a description of all the current existing interoperability arrangements thus including the one on ETDs, and Section 3.1.2, that clarifies the application of the EMIR framework to existing and potential future interoperability arrangements on derivatives. Please also note that aspects related to recovery and resolution are not addressed in this report due to a lack of a harmonised EU regime to resolve CCPs.
5. Unlike the ESRB report, ESMA in this report takes a micro economic perspective, describing the number and complexities of the arrangements and then assessing the adequacy of the different risk models. In this respect, it is worth noting that this report does not constitute a reassessment under EMIR of any of the existing interoperability links.
6. The report starts with a general overview of the interoperability concept and the applicable EU regulatory framework with a description of the current interoperable links involving an EU CCP, including on their number and complexity. Then follows an assessment of the benefits and impacts on costs for the relevant parties. The last section is dedicated to the prudential analysis and consequences at CCP level and the risk devices used to mitigate the potential risks arising from interoperability including some quantitative data. The key risk under consideration is the counterparty credit risk resulting from exposures between interoperable CCPs. Whilst there are scenarios under which under-collateralisation can materialise, EMIR and the Guidelines and Recommendations address how these cases should be catered for via inter-CCP

² http://www.esrb.europa.eu/pub/pdf/other/2016-01-14_Interoperability_report.pdf?1df2a4ba465726ea9a9077fb61940c34



arrangements. Along those lines, the evidence collected on the current CCP practices show that EU CCPs have set-up mechanisms to adequately mitigate potential risks of under-collateralisation, even in cases where re-use is permitted.

7. This report refers to the situation as of the date of its publication and is based on public information, information ESMA has collected in the context of its participation in EU CCPs colleges and information received from EU interoperable CCPs responding to an ESMA specific data request. The information has been anonymised when necessary.

3 General overview

3.1 Current status

3.1.1 Concept and definition

8. In the international context, CPMI-IOSCO, in its PFMI, identifies three types of CCP-to-CCP links whereby a CCP may establish links with one or more other CCPs. First CPMI-IOSCO refers to the peer-to-peer link whereby two or more CCPs maintain special arrangements with each other. CPMI-IOSCO indicates that “the linked CCPs face current and potential future exposures to each other as a result of the process whereby they each net the trades cleared between their participants so as to create novated (net) positions between the CCPs. Risk management between the CCPs is based on a bilaterally approved framework”. Even though the CCPs are not subject to each other’s normal clearing members rules CPMI-IOSCO mentions that “the CCPs exchange margin and other financial resources on a reciprocal basis”.
9. The second type of link described by CPMI-IOSCO is the participant link, where one CCP is a participant in another CCP and is subject to the host CCP’s normal clearing member rules. In this case the participant CCP provides margin but does not collect any from the other CCP which means that the former should hold additional financial resources to protect itself against the default of the latter. This could mean that the participant CCP may not have adequate protection in case the host CCP defaults because the participant CCP does not hold collateral from the host CCP to mitigate the counterparty risk posed to it by the host CCP unlike in the peer-to-peer link. Risk protection in a participant link is one-way, unlike in a peer-to-peer link.
10. Finally an inter-CCP link can exist when two or more CCPs may enter into a cross-margining arrangement, which is an agreement among CCPs to consider positions and supporting collateral at their respective organisations as a common portfolio for participants that are members of two or more of the organisations. In the event of a participant default under a cross-margining arrangement, participating CCPs may be allowed to use any excess collateral in the cross-margined accounts to cover losses.
11. Article 2 of EMIR defines an interoperability arrangement as an arrangement between two or more CCPs that involves a cross-system execution of transactions. The reference to cross-system implies that there should be a reciprocal link (peer-to-peer link) between the CCPs which would allow one to clear trades through the other and vice-versa.
12. This allows access to any local market without having to become a local actor. At clearing level this means that a clearing member from a CCP would be able to access the clearing scope of another CCP without having to become a clearing member of corresponding CCPs thanks to the inter-CCP links.
13. Reciprocity, i.e. the possibility for each CCP to clear transactions against the other(s), was a very relevant element when differentiating interoperability from a situation where a

CCP becomes the clearing member of another CCP (participant link) or has cross margining arrangements. In the latter cases reciprocity does not exist. Based on those descriptions interoperability as envisaged in EMIR, falls only under the peer-to-peer category. This report will only address interoperability with the exclusion of any other type of CCP link.

3.1.2 Regulatory framework

14. The “European Code of Conduct for Clearing and Settlement”³ (the Code of Conduct) dated 7 November 2006 founded a voluntary framework for establishing links between CCPs for cash equities. It aimed at enhancing transparency and increase competition in the post-trading sector.
15. The second pillar of the Code of Conduct was open access and competition by means of links (interoperability) in equities markets, according to which infrastructures have a reciprocal right to become members of another infrastructure, unless specific risk concerns have been identified. Many trading and post-trading infrastructures signed the Code of Conduct, however, the post-trading sector continued to be fragmented along national lines, hindering cross-border harmonisation.
16. In 2012 EMIR laid down the conditions for the establishment of interoperability arrangements between CCPs to ensure that they do not expose the relevant CCPs to risks that are not appropriately managed.
17. EMIR was implemented in the context of the PFMI published on 16 April 2012⁴. Principle 20 relates to FMI links in general and four of the related Key Considerations (1, 2, 7 and 8) apply to CCP links specifically. For CCPs the PFMI have identified 4 risks. EMIR caters for each of those Key Considerations which prescribes that an FMI establishing a link with one or more FMIs should identify, monitor and manage link related risks.
18. Few Articles in Title IV Chapter 3 of EMIR refer to interoperability and it is mainly Title V which establishes a specific regulatory framework for interoperability arrangements between CCPs. In addition to the requirements for interoperability contained in those EMIR Level 1 provisions, ESMA has also issued, after consulting the members of the ESCB, the Guidelines and Recommendations which were published in March 2013 and applied from 10 June 2013⁵.
19. The Guidelines and Recommendations contain five guidelines and recommendations: one related to legal risk, one related to open and fair access, one related to the

³ http://ec.europa.eu/internal_market/financial-markets/docs/code/code_en.pdf

⁴ <https://www.bis.org/cpmi/publ/d101a.pdf?>

⁵

https://www.esma.europa.eu/sites/default/files/library/2015/11/esma_guidelines_u_recommendations_on_interoperability_arrangements_-_as_approved_by_bos_20130314.pdf

identification, monitoring and management of risks, one related to the deposit of collateral and the final one related to the cooperation between NCAs.

20. It is worth noting that recital 73 of EMIR indicates that given the additional complexities involved in an interoperability arrangement between CCPs clearing OTC derivative contracts, it is appropriate to restrict the scope of interoperability arrangements to transferable securities and money-market instruments. Along the same lines Article 1 of EMIR on its “subject matter and scope” states that Title V of EMIR on interoperability arrangements “shall apply only to transferable securities and money-market instruments”.
21. This does not mean that interoperability links on derivatives are prohibited but that interoperability on derivatives is not subject to EMIR Title V provisions. This was also clarified in paragraph 14 of the Final report on the Guidelines and Recommendations⁶.
22. In particular, should interoperability arrangements on derivatives involving EU CCPs arise, the NCA should use the Guidelines and Recommendations to perform the overall CCP risk assessment. However, no specific recommendation was developed either for (OTC) derivatives interoperability arrangements or for specific risks arising from these arrangements.
23. In addition, EMIR applies to all activities performed by CCPs, therefore even if Title V of EMIR does not apply, interoperability arrangements on derivatives have been subject to the scrutiny of CCP colleges during the authorisation process.
24. On the same topic ESMA has published in July 2015⁷ a report on the extension of the scope of EMIR provisions to derivatives. The report considered that notwithstanding the fact that the provisions ruling interoperability in EMIR related to high level principles on risk management without going into the specificity of the products covered, there were additional complexities for OTC derivatives and the effects of the clearing obligation still needed to be assessed in terms of higher risks for CCPs. The conclusions were thus to extend the scope of EMIR to ETDs but not to OTC derivatives. The EC has not yet provided any feedback on the possibility to endorse such a proposal. For this reason this report does not anticipate any extension to EMIR to derivatives whether OTC or ETDs.
25. In its last Questions and Answers document published on 4 February 2016⁸, in CCP question n°21, ESMA addresses the application of the Guidelines and Recommendations 3(b)(v) on the prohibition for interoperable CCPs to contribute to each other’s default funds together with the need for them to cover credit and liquidity risk. It specifies that it is not necessary for a CCP to include its credit exposures to the interoperable CCPs when sizing the default fund and other financial resources. However, in that case, it will need to have other arrangements (such as additional margin) in place

⁶ https://www.esma.europa.eu/sites/default/files/library/2015/11/2013-323_annex_1_esma_final_report_on_guidelines_on_interoperability.pdf

⁷ https://www.esma.europa.eu/sites/default/files/library/2015/11/2015-1067_report_on_io_extension_0.pdf

⁸ https://www.esma.europa.eu/sites/default/files/library/2016_242_qa_xv_on_emir_implementation.pdf

in order to meet Guideline and Recommendation 3(b)(i) which requires that financial risks, including custody risks, arising from the interoperability arrangement are identified, monitored, assessed and mitigated with the same rigour as the CCP's exposures arising from its clearing members.

26. The main focus of EMIR provisions on interoperability and of the related Guidelines and Recommendation is on risk aspects. The rationale to this is to ensure that any extra or different risk arising from interoperability arrangements compared to a stand-alone CCP is catered for.
27. Article 51 of EMIR also refers to access. It is worth noting that, on this topic, for ETDs MiFIR requires that, in the case of request for access from a trading venue to a CCP or vice-versa, the competent authority of the trading venue or that of the CCP grants access only where such access would not require an interoperability arrangement⁹ that has not already been agreed on and where the inter-CCP risk is covered. These restrictions to access in MiFIR are compatible with the current EMIR framework that covers interoperability for money market instruments and transferable securities only. For OTC derivatives, subject to the clearing obligation, EMIR foresees that, in case a CCP requests access to the trade feed from a trading venue access should be granted only where such access would not require interoperability¹⁰.
28. The Bank of England issued a consultation paper on the supervisory approach that it contemplated to implement the Guidelines and Recommendations to elicit feedback from interested parties. In July 2015, it published a report on "Implementation by the Bank of England of ESMA's Guidelines and Recommendations on CCP interoperability arrangements: summary of feedback received and policy response"¹¹ containing the standards of assessment that the Bank of England would ordinarily apply, at a minimum, as part of its supervisory approach towards assessing interoperability arrangements involving UK CCPs.
29. The following section contains a description of the current main interoperable arrangements involving at least a CCP established in the EU and which thus have been approved under Article 54 of EMIR at the time of re-authorisation of incumbent CCPs when EMIR came into effect, except for the link between LCH.Clearnet Ltd and SIX x-clear's Norwegian branch which is not covered by Title V of EMIR, but for which the relevant NCAs have followed the Guidelines and Recommendations when assessing the risks arising from this interoperable arrangement on derivatives in the context of EMIR application to EU CCPs. This arrangement was approved by the LCH.Clearnet Ltd college during the authorisation process for LCH.Clearnet Ltd as described in paragraph 23 above.

⁹ Regulation (EU) no 600/2014 of the European Parliament and of the Council of 15 May 2014 on Markets in Financial Instruments and amending Regulation (EU) No 648/2012, Article 35 and 36. <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0600&from=EN>

¹⁰ EMIR Article 8.
¹¹ http://www.bankofengland.co.uk/financialstability/Documents/fmi/CCP_interoperability_arrangements_0715.pdf

3.1.3 Current status of EU links

3.1.3.1 Equities (see section 6 Annex)

30. Numerous access requests were exchanged between market infrastructures following the issue and signature of the Code of Conduct, however few links became operational especially for newly created MTFs at the time. The links have slowly developed since then and generally the current interoperability links between CCPs for equities markets are similar to what they were then.
31. Nearly all the interoperable links mentioned in section 6 Annex were in place before EMIR came into force apart from the one for Aquis exchange which was created in October 2012 (the corresponding CCPs were already interoperable on other exchanges) and the one for Oslo Børs/Oslo Axess which went live in 2014 but for which a Memorandum of Understanding had been signed between LCH.Clearnet Ltd and Oslo Clearing (now SIX x-clear Norwegian branch) back in 2009.
32. As foreseen in Article 54 of EMIR, those links and the corresponding arrangements were approved by the relevant NCAs at the time each interoperable EU CCP was authorised through a college opinion and thus deemed compliant with EMIR. It is anticipated that, following the EFTA and EC agreement, EEA countries will soon transpose EMIR. In any case the EC has issued an Implementing Decision (EU) 2015/2042 of 13 November 2015 on the equivalence of the regulatory framework of Switzerland for central counterparties to the requirements of EMIR. Flowing from this SIX x-clear is deemed to be subject to a regulatory framework which is equivalent to EMIR.

3.1.3.2 EU government bonds: LCH.Clearnet SA – Cassa Di Compensazione e Garanzia (see section 6 Annex)

33. One interoperability scheme has been identified in the EU for government bonds. It is between LCH.Clearnet SA and Cassa di Compensazione e Garanzia (CC&G). It was designed, even before the Code of Conduct, in 2002 and activated in August 2004. The link between LCH.Clearnet SA and CC&G covers the clearing of outright transactions and repos on Italian government bonds traded on MTS Cash and MTS Repo platforms and BrokerTec-ICAP. Both CCPs are part now of the London Stock Exchange Group.
34. For the implementation of the link, the two CCPs have a special status in their access rules to each other's system, which is different from that of the ordinary clearing members.
35. As foreseen in Article 54 of EMIR this link and the corresponding arrangements were approved by the relevant national competent authorities at the time LCH.Clearnet SA and CC&G were authorised through a college opinion and thus deemed compliant with EMIR.

3.1.3.3 EU ETDs: LCH.Clearnet Ltd and SIX x-clear Norwegian branch (previously Oslo Clearing) (see section 6 Annex)

36. Only one interoperability scheme has been identified for ETDs. LCH.Clearnet Ltd interoperates with SIX x-clear Norwegian branch (previously Oslo Clearing) with regard to index and single Norwegian stock futures and options listed on Oslo Børs and London Stock Exchange Derivatives Market in a joint order book. This cooperation originally started in 2009.
37. Whilst outside of the scope of Article 54 this interoperability link has been assessed in the context of LCH.Clearnet Ltd authorisation under EMIR and thus deemed compliant with the Guidelines and Recommendations.
38. The EC has issued an Implementing Decision (EU) 2015/2042 of 13 November 2015 on the equivalence of the regulatory framework of Switzerland for central counterparties to the requirements of EMIR. Flowing from this SIX x-clear is deemed to be subject to a regulatory framework which is equivalent to EMIR.
39. To conclude on the number and complexity of interoperability links we can note that whilst the number of links is fairly limited, their cross-border nature is very developed, at least for the links clearing equities. Each CCP's activity is already international on a stand-alone basis so their interaction increases even further the international network.
40. Now that the regulatory scheme in Europe has been detailed and the current landscape of interoperability arrangements described to give a sense of its complexity in terms of number of links, of entities, of countries, of type of financial instruments involved, we will in the rest of this document describe the benefits and costs of such interoperability arrangements more generally.

3.2 Benefits

3.2.1 Broader access

41. The primary aim of links between market infrastructures, including interoperability arrangements, was to open markets to competition, at trading and clearing level, and add new trading and clearing actors on top of the existing ones. Interoperability allows a CCP to have access to a trade flow without fragmenting the liquidity; any trade coming from a trading venue can be cleared either through one CCP, when the relevant clearing members belong to the same CCP or, through the interoperable link when the relevant clearing members belong to each of the interoperable CCPs.
42. On top of bringing competition and increasing interactions between different market communities, this broader access potentially raises volumes traded in the relevant financial instruments and increases liquidity due to the growth in the participant base of a trading venue.

43. As for any other industry, competition, or even the anticipation of potential competition, has led to significant fee decreases (see Section 3.3.2) and has arguably pushed the competing entities into improving their services and client satisfaction.
44. The improved interaction amongst market communities and the broader access to markets without the need for clearing members to be members of each CCP has reduced the need for technical connections and the relevant contractual frameworks set-up, which not only has reduced costs but also operational and legal risks for clearing members (see Section 3.3.2).
45. The access to more trading venues and CCPs could also be a tool to improve best execution as introduced by MiFID and which requires that investment firms take all reasonable steps to obtain the best possible result for their clients, taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to order execution.
46. Another benefit of interoperability and broader access is the increase of substitutability of CCPs. In case one CCP encounters difficulties that prevent it from operating the other interoperable CCPs may be in a position to offer an alternative clearing solution to the clearing members of the failing CCP.

3.2.2 Netting efficiency

47. Allowing clearing members to access a larger number of CCPs via interoperable links, gives a greater scope of multilateral netting than if the CCPs were unlinked. The lower the number of CCPs that a single CM needs to access, the higher the degree of netting, thereby the lower the aggregate credit risk (and, as a result, the lower the demand for collateral).
48. Netting also has the benefit of reducing the number and value of delivery and payment instructions needed to settle a given set of trades; this reduces liquidity risks as well as transaction costs.
49. After having explored the benefits of interoperability we will now concentrate on the costs implied by interoperability for the relevant entities along the transaction chain.

3.3 Impact on costs

3.3.1 For CCPs

50. From an operational perspective, interoperability implies higher costs because CCPs have to connect to other CCPs. Those costs can be both one off costs for the set-up of the technical connections and running costs to maintain and run the link. Some costs are also due to the necessary contractual documentation and approval process.
51. On top of those direct connection costs those links may, as for any other service a CCP provides, entail some “indirect” costs due to higher capital requirements to cover the

extra legal and operational risks under Article 3 of RTS No 152/2013 of 19 December on capital requirements for CCPs.

52. One could argue that the interoperable link avoids the costs that CCPs would incur by giving access to a multitude of clearing members, so in the end the cost of interoperability, whilst being higher than the cost of a standalone CCP, might be equivalent or lower than having this standalone CCP giving access to a new community of clearing members.
53. Finally, the item that could incur the most relevant cost related to the link between CCPs is probably the counterparty credit risk that each CCP incurs due to the interoperability link. Indeed the linked CCPs face current and potential future exposures to each other as a result of the process whereby they each net the trades cleared between their participants so as to create novated (net) positions between the CCPs. This cross-CCP exposure needs to be covered by the CCPs.
54. Arguably all extra costs that CCPs incur due to interoperability could be passed on to their clearing members which may then pass them on to their clients, where relevant. The legal and technical and operational costs could be deemed to be less significant and will not (directly) increase depending on the amounts of transactions going through the links or the number of clearing members, which means that they could become marginal if the activity increases significantly. This is not the case, however, for the extra collateral, if any, required to cover the inter-CCP exposure (whether provided by the clearing members or by the CCP itself) which will be proportionate to the margin requirements for clearing members and will directly be correlated to the activity in the interoperable link.

3.3.2 For clearing members (through to their clients)

55. As described in Section 3.2.1 interoperability enables clearing members to avoid having to plug into several CCPs to clear transactions from several trading venues. This translates directly into technical (connection and running), operational, membership and legal cost savings.
56. As explained above, competition introduced at trading level by MiFID and competition at clearing level saw a drastic fall of the clearing fee charged by the CCPs to clearing members. However, since then and more specifically since EMIR came into force fees have not significantly decreased.
57. The reduction of the number of settlement instructions due to netting efficiency that interoperability brings, decreases the cost of settlement that the CCP pays to the settlement systems whether for cash or for securities. Having in mind that in many cases those costs are fully passed on to the clearing members, this saving will impact clearing members. Besides clearing members also benefit (and probably to a greater extent) through the netting of their own settlement instructions to CSDs. Unlike the clearing fee reduction this settlement fee discount is harder to quantify since the difference in number

of settlement instructions will depend on the netting efficiency which is hard to assess a priori.

58. The item related to costs which is less easily assessable and thus might not be conclusive is the amount of extra collateral that clearing members will have to post to a CCP in the context of an interoperable link as opposed to having cleared the same transactions through two independent CCPs.
59. As described in Section 3.2.2 netting efficiency implies lowering the counterparty credit risk clearing members are facing and thus the need for margin and corresponding collateral since the link allows clearing members net long and short positions vis-à-vis all clearing members of the interoperable CCPs. The positions are netted across the CCPs, inducing a higher degree of netting. However some new inter-CCP credit risk is created due to the interoperability link and it needs to be covered by collateral that the interoperable CCPs provide to one another.
60. According to some authorities, the provision under Article 41 and the following articles of EMIR, according to which a CCP shall call and collect margin to fully collateralise its exposure with its clearing members and with interoperable CCPs and point 3(f)(i)(b) of the Guidelines and Recommendations, seem to indicate that a CCP cannot re-use the collateral its clearing members have provided to cover the CCP's exposure to them. This interpretation is shared by respondents to the Bank of England consultation and was thus retained as a standard for assessing interoperability arrangements for UK CCPs that the Bank of England issued¹².
61. On the other hand, some other authorities note that this prohibition is not stated in EMIR Level 1. On the contrary, Article 52 of EMIR, subparagraph 4, envisages that "CCPs shall have robust controls over the re-use of clearing members' collateral under the arrangement, if permitted by their competent authorities".
62. Since Guidelines and Recommendations should not introduce new requirements for CCPs in addition to the ones specified in EMIR, the Guideline and Recommendation 3(f)(i)(b) should not be interpreted restrictively. It is further argued that it just provides that the CCP identifies how it will cover exposures originating from the interoperability arrangement, including (letter b) "how it will meet exposures following the default of an interoperable CCP without reducing the CCP's ability to fulfil its obligations to its own clearing members".
63. In any case, the credit and liquidity risk arising from the re-use of margin should be adequately mitigated by the CCPs. This could be achieved through, amongst others, segregation, protection, and custody of margin exchanged between CCPs in a manner that allows for its swift and timely return to the CCP.

¹² http://www.bankofengland.co.uk/financialstability/Documents/fmi/CCP_interoperability_arrangements_0715.pdf

64. Thorough legal analysis has led ESMA to the conclusion that re-use of the collateral provided by clearing members to cover their own positions (as opposed to extra assets provided by the clearing members on top of their margin requirements), is possible to the extent that it is clearly described and that, as stated in paragraph 66, the arising extra risk is adequately assessed and covered by each interoperable CCP. Moreover Article 52.1 sub-paragraph 4 of EMIR states that the CCPs need to have robust controls over the re-use of clearing members' collateral under the arrangement, if permitted by national competent authorities. Therefore national competent authorities can deny the re-use of collateral.
65. Currently in most interoperable links EU CCPs are relying on extra clearing members' assets to cover their inter-CCP exposure. The overall amount of inter-CCP margin varies and is defined according to different margining devices described in Section 4, and the way this amount is dispatched to the clearing members also differs. The rationale generally seems to be reallocation in proportion of the clearing member's use of the interoperability link but in practice, since it is hard to assess how much of a clearing member's position was done through an interoperable link, it is done in proportion of the initial margining paid by the clearing member to the CCP for the relevant trading venue overall without any assessment of how much of the transactions went through the interoperable link or not.
66. Another risk that can induce extra costs appears in case the default waterfall foreseen in Article 45 of EMIR is used in case of a default of an interoperable CCP.
67. Whilst the current situation and the increasing use of interoperability seem to prove that interoperability is beneficial for the clearing members, assessing the positive or negative impact of interoperability regarding collateral depends on a number of assumptions. Balancing the collateral decrease due to the netting efficiency compared to a situation where there is no link versus the extra collateral to cover inter-CCP risk, if any, whether at systemic or individual clearing member level, would require quite a sophisticated modelling which has not been developed yet, even though some of the parameters to build such a model are known (number of clearing members, concentration and direction of positions etc...). For the other costs of interoperability, the balance is quite positive and arguably the saving could be benefiting the clients of the clearing member and the market community in general.
68. The next section will concentrate on the prudential aspects of interoperable links at micro level by first analysing the impact that interoperability entails on the risk borne by each CCP and then assessing the adequacy of the tools used to cover such risks.

4 Impact on risks at individual CCP level and assessment of risk-management systems and models

4.1 Inter-CCP credit risk

4.1.1 Qualitative analysis

69. The purpose of this section is to provide a qualitative assessment of the adequacy of risk measurement and management systems and models put in place to mitigate the specific risks originating from interoperability arrangements. The key risk under consideration here is the counterparty credit risk resulting from exposures between interoperable CCPs, i.e. the risk that one CCP, party to such an arrangement, is not able to honour its financial obligations to its interoperable CCP. The focus of the chapter lies on the assessment of potential systemic character of the counterparty credit risk embedded in interoperability arrangements. This means that the probability of a severe loss and potentially a default of a CCP resulting directly from a default of another, interoperable CCP will be analysed.
70. It is important to note that the default of an interoperable CCP would likely result from an initial default of its clearing member or a simultaneous multitude thereof, accompanied by a severe market stress scenario. The interoperable CCP would potentially go into default if this scenario resulted in an exhaustion of the financial resources sized and set aside according to EMIR minimum requirements. This assumption is in line with other work streams carried out by ESMA, e.g. the EU-wide CCP stress tests where the focus of the analysis for the first exercise is on credit risk.
71. Reasons other than clearing member default for which a CCP might not be able to honour its obligations, e.g. investment risks, are not analysed further in this report. Given the assumption of compliance of authorised CCPs with requirements of EMIR and technical standards, the focus on credit risk events is considered more relevant. Therefore this report will not address cases directly linked to investment risk.
72. As already mentioned in previous sections, interoperability arrangements facilitate the novation of trades between participants of two (or more) different CCPs. The key difference of interoperability arrangements, when compared to traditional central clearing involving only one CCP, is the process of the trade novation. In the context of interoperability arrangements the initial trade between a buyer and a seller is novated into three contracts: between the seller and its CCP, between the buyer and its CCP and one between the two linked CCPs. Financial obligations between interoperable CCPs arise precisely from the position across the interoperable link. This is obvious, but important for the risk assessment: inter-CCP exposures only exist when clearing members hold positions across the link, i.e. each leg of a transaction is maintained at one CCP.

73. The following sections of this chapter develop a simple model framework with the objective of analysing the potential systemic risk of interoperability arrangements and defining how specific market design parameters influence it. Systemic risk will be defined here as credit risk driven “knock-on” mechanism between interoperable CCPs. Credit risk driven “knock-on” effect within an interoperability arrangement comes into place when in parallel to exhaustion of financial resources dedicated to the default waterfall of CCP A, triggered by defaults in its clearing member community, CCP A’s exposures to the other CCP (or CCPs) connected by the interoperability arrangement increase subject to adverse changes of risk factor prices and cannot be covered by collateral collected from CCP A. Hence in order to assess the risk of default transmission as defined for the purpose of our framework, the size of financial resources set aside for the default waterfall at CCP A (usually consisting of: margin collateral of the defaulted clearing member, skin in the game, default fund and the equity of the CCP) must be put in relation to resources collected from the CCP A to collateralize its exposures to an interoperable CCP partner (partners). The situation in which the financial resources CCP A has at its disposal, including amounts collected from clearing members dedicated to manage the default waterfall, are lower than collateral interoperable CCPs would collect from the CCP A to cover losses from its potential default, will be defined as under-collateralization of the interoperability arrangement. The state of under-collateralization indicates the systemic risk embedded in the interoperability arrangement. The model framework is defined as the interoperable CCPs and their mutual contractual obligations, margining methodologies for exposures arising between them, methodologies to size resources a CCP has at its disposal to manage defaults in its clearing member community and the characteristics of the market for financial instruments cleared under the arrangement.
74. It will be assumed that:
- CCPs collect risk dependent margin for the inter-CCP exposures and margin collateral from their clearing members based on their own methodology;
 - a predefined part of the market in the underlying financial instruments will be cleared under the arrangement; and
 - the clearing members route their trades under the premise of minimizing the margin requirements they are required to meet.
75. The following sections investigate the probability of under-collateralization of an interoperability arrangement as a function of typical market design characteristics defined under subsequent framework assumptions, including: number of clearing members, part of the market cleared over the link and potential heterogeneity in margin methodologies and finally the question of collateral re-use agreements.
76. For the purpose of the following sections it is also assumed that individual methodologies designed to size the resources of all CCPs party to the interoperability arrangement are robust, prudent and fulfil EMIR requirements so default probabilities of individual CCPs will not be re-assessed.

4.1.1.1 Case 1: one clearing member and homogeneous margining methodologies

77. To assess the risk of transmission of losses from clearing member default to the interoperable exposures we consider the simplest scenario first: the only clearing member of the CCP A defaults and has an open position which is cleared over the bilateral interoperable link established with the CCP B. Of course CCPs must have sufficient financial resources to withstand losses linked to default of at least two largest clearing members under severe but plausible market conditions according to EMIR but the scenario will be assumed nevertheless to introduce the framework of the analysis.
78. The exposure of the defaulting clearing member is the only exposure the CCP A clears over the interoperable link. CCP A collects initial margin to cover the risk arising from the clearing member position. In line with the existing regulation, CCP B collects margin from CCP A to cover the novated position over the interoperable link. If the clearing member defaults potential losses will be absorbed by the CCP margin, the dedicated amounts of the CCP and the default fund. Only when the CCP A cannot service margin calls issued by the CCP B and is put into default, the inter-CCP margins collected from CCP A will be used to absorb inter-CCP losses. In the first step we also assume that both margining mechanisms are identical. In this simplified scenario the transmission comes into effect if both the CCP and inter-CCP margins are exhausted. In this case the price shock leading to a transmission effect would need to be severe enough to exhaust CCP A resources conditional on default of the clearing member and the inter-CCP margin collected from CCP As mentioned above, it is important to emphasise that the inter-CCP margin can be exhausted only if the CCP margin (plus additional resources such as default fund) has been exhausted before. This means that the depletion of inter-CCP margin, calibrated to withstand a very rare event at a high confidence level, may occur only conditional on realisation of another dependent but very rare event measured at an even higher confidence level.
79. For a numerical assessment, assume that financial resources at CCP A (CCP margin and other financial resources) cover a loss at a confidence level of 99.9% and the inter-CCP margin model is calibrated to cover a loss at a confidence level of 99%. In this scenario the likelihood of mutual occurrence of both events (exhaustion of CCP A resources and inter-CCP margin) is comparable with the realisation of a 1% probability event conditional on occurrence of a scenario with an estimated probability of 0.1% which is an extremely rare event even in a period of very high market volatility. Clearly such a case is not characterised by under-collateralization as defined previously and poses no additional systemic risk.

4.1.1.2 Case 2: multiple clearing members and homogeneous margining methodologies

80. If the above case is extended to multiple clearing members that clear all their positions over the inter-CCP link, the assessment changes slightly. Now the inter-CCP margin collected from A is calculated based on netted positions of inter-CCP exposures whereas the CCP margin, collected from clearing members for their positions, is a sum of margins calculated based on netting sets of exposures of each individual clearing

member to the CCP A. We still assume that the methodology driving the calculation of both margins is identical.

81. If the positions of members clearing over the link are rather multidirectional (with a share of members holding long and short positions) the sum of member margins posted at CCP A will be significantly higher than the required inter-CCP margin. The amount of margins required to cover the risk related to the inter-CCP portfolio reflecting netted long and short exposures will be lower, than the one related to each member positions whether long or short at each CCP. This is a scenario in which the under-collateralization as defined in previous paragraphs is limited.
82. However even in a case in which exposures of clearing members cleared over the link are rather unidirectional (e.g. with an overhang of long or short positions across all clearing members of CCP A) the risk of under-collateralisation is limited. This is the sheer consequence of the fact that the margin models of the CCP A and of the interoperable CCP B which is used to size margins collected from CCP A are identical. Therefore CCP B will not request more margins from CCP A than the margins that CCP A collects from its members.¹³
83. In a framework of interoperability arrangements linking only two CCPs, members cannot increase exposures across the link without a simultaneous increase of their own exposures to their respective CCPs. Hence ceteris paribus the margins collected by CCP A from their clearing members must be at least equal to the margin requirement of the interoperating CCP. This would only be equal in the case when all positions held by clearing members were either long or short. Any deviation from this unrealistic assumption stipulates that margin collected from clearing members is higher than the inter-CCP collateral. This clearly represents a scenario with no risk of under-collateralization as defined in the framework assumptions.

4.1.1.3 Case 3: multiple members clearing only part of their positions over the interoperability arrangement and homogeneous margining methodologies

84. In the above discussion cases were examined where clearing members held a single position (or alternatively all their positions) across the interoperable link. Generally a clearing member will hold multiple positions, while only a subset of them might be cleared over the link. In the first step we assume that CCP A and CCP B have the same margin methodology, as the purpose of this case is to assess the ability of the CCP A to manage the unwinding of positions of a defaulted clearing member and the potential risk of default transmission in a more complex scenario.
85. We consider a situation with two clearing members CM1 and CM2 at CCP A. Clearing member CM1 has a long position in instrument IN1. Clearing member CM2 has a short

¹³ This refers directly to arrangements under which collateral posted by clearing members may be reused. In other types of arrangements the risk of under-collateralisation can be considered a proxy measure for additional collateral CCP would need to source independently.

position in instrument IN1 and long a position in instrument IN2. IN1 and IN2 are strongly positively correlated and this results in margins offsetting/savings under the CCP portfolio margining methodology (which is the same for both CCPs under this case). The counterparty to IN2 is a member of the interoperable CCP B, i.e. CCP A has a net long position exposure in IN2 against the interoperable CCP. In this situation CCP A will collect margin for the position in IN1 from CM1 and margin for the netted combined long/short position in IN1 and IN2 from CM2. CCP B will collect inter-CCP margin from CCP A for the position in IN2. The following example will help to visualise the scenario. CCP A collects a margin of 20 from CM1 for the netted position of long in IN1 and short in IN2 reflecting the offsetting effects. Meanwhile the amount of 100 is collected from CCP A by CCP B as only the short position in IN2 is cleared over the link. In this case the inter-CCP margin posted by CCP A for the account of CM2 will obviously be higher than the margin CCP A collected directly from CM2 which would bear risk of under-collateralization as defined in paragraphs above.

86. If only CM1 and not CM2 was clearing its positions over the interoperability arrangement no risk of under-collateralization would exist at all as the scenario would present an analogous set-up as case 1. CCP A would collect margin in the amount of 50 from CM1 and would need to post an equal amount of 50 as inter-CCP margin.
87. CCPs rely on various techniques to mitigate the risk of under-collateralisation stemming from these types of scenarios potentially arising within interoperability arrangements between CCPs. These are explained in section 4.1.1.7.

4.1.1.4 Case 4: heterogeneous margining methodologies

88. The above scenarios and considerations show clearly that the level of protection of the inter-CCP exposures depends also on two margin models: the model used by CCP A to calculate margin collected for clearing member positions and the methodology used by CCP B to collect inter-CCP margin. If CCP B uses Expected Shortfall to calculate margins collected from CCP A and CCP B applies a Value at Risk based methodology for calculating margins it collects from its clearing members the former amount will always be higher even if all other margin parameters (confidence level, look back period etc.) of both CCPs are identical. This results from the simple characteristics of both risk measures. There is another instance where it is more likely that the inter-CCP margins collected from CCP A are higher than margins collected by CCP A from its members, which is in case CCP A applies portfolio margining to its clearing members exposures whereas the interoperable CCP B does not for the inter-CCP margin collected from CCP A. Under this scenario an inter-CCP margin call triggered by a clearing member's trade over the link could be higher than the CCP margin collected from the clearing member. In an extreme scenario an inter-CCP margin call could be accompanied by collateral release to the clearing member if an incremental trade with a hedge effect on the clearing member exposure would not be recognised as such for the benefit of the inter-CCP margin. This translates into the risk of under-collateralization as defined above. Techniques applied to mitigate this type of systemic risk embedded in interoperability arrangements with heterogeneous margining methodologies are described in a

subsequent section 4.1.1.7. It is however essential that both CCPs understand mutual risk management and margining methodologies.

4.1.1.5 Case 5: multilateral interoperability arrangements

89. Another scenario for which the risk of under-collateralisation potentially exists is a multilateral interoperability arrangement, i.e. an arrangement under which clearing members of any of the interoperable CCPs can clear their trades via links with any of the interlinked CCPs. Unlike in interoperability arrangements with just two CCPs, traders in multilateral frameworks may be entering offsetting trades towards their CCPs while the novated cross CCP positions do not offset. This results from the fact that cross CCP margins are usually based on the sum of the margins to each interoperable CCP. A clearing member may have a perfectly hedged portfolio at CCP A while through the interoperable link long positions are maintained at CCP B and short positions at CCP C. A case of a clearing member with a hedged exposure consisting of two strongly negatively correlated trades helps to visualise this. Instrument IN1 is cleared over the part of the link with CCP B and IN2 over the link with CCP C. CCP A has to post initial margin of 100 at CCP B and at CCP C each whereas it receives only 20 from the clearing member. Typically CCPs address this type of risks by add-ons on margins, allocating the inter-CCP margin to the clearing members on a pro rata basis or additional facilities enhancing the resources dedicated to the default waterfall.

4.1.1.6 Case 6: collateral re-use

90. The picture becomes more complex with the introduction of a collateral re-use provision into the model. As already mentioned before in such a case a CCP would be allowed to post the initial margin posted by its clearing members as an inter-CCP margin, provided that it is unencumbered and eligible under the interoperability arrangement. Under this provision parts of the margin pools securing the clearing members' and inter-CCP exposures would be covered by the same collateral. Its unbounded re-use might lead to under-collateralisation of the interoperability arrangement as in an extreme scenario all exposures of CCP A toward CCP B would be secured by collateral which had initially been posted to secure clearing members' exposures to CCP A. This means that the likelihood of a transmission effect could be higher than in an analogous no re-use case because the available financial resources the CCP A has at its disposal to cover losses resulting from a default of the clearing member would be lower.

91. Translating this into the simple scenario presented in case 1 means, that the simple likelihood estimation of the risk of default transmission (e.g. "transmission based on occurrence of a 1% probability event conditional on a scenario with an estimated probability of 0.1%") would no longer hold. It would not because either the CCP A would not have collateral to cover losses at 99.9% confidence level since part of it were certainly encumbered or the inter-CCP exposure would not be collateralised at 99% by fully funded margins. The estimation of impact of this effect is complex and requires a range of additional assumptions which influence the final picture. However it would be prudent to say that re-use of collateral is potentially increasing the risk of default

transmission. Considering this possibility, measures to mitigate this risk have been contemplated; they are described in Section 4.1.1.7.

92. A condition under which collateral re-use might introduce additional risk in an interoperability arrangement is the subcase in which requirements on the quality of collateral for inter-CCP and CCP margins differ, e.g. CCP A has to post cash to cover initial margin calls whereas its clearing members can post securities. This poses liquidity risk issues as CCP A might have to be able to repo the collateral received in order to post cash margins arising from its exposures to the interoperable CCP.
93. Typically the size of inter-CCP to CCP margins will determine the level of additional risk stemming from re-use provisions. Scenarios in which inter-CCP margin is always lower than margins collected from clearing members (e.g. Case 1 and 2) are less exposed to risk stemming from re-use provisions. The degree to which collateral re-use might pose systemic risk depends on the characteristics of the underlying market and the liquidity and volatility of the cleared financial instruments since they influence the procedure of unwinding positions of a defaulted clearing member either under an auction mechanism or outright sale. It is simply more likely to timely auction, at a lower loss, liquid government securities than less liquid derivatives. The concentration of clearing member exposures and posted collateral also plays a role in estimating the degree of risk the re-use of collateral poses on the interoperability arrangement.
94. Risks resulting from re-use clauses are mitigated by interoperable CCPs mainly through design of prudential add-ons enhancing the default waterfall or liquidity pools serving as backup facilities for intraday margin calls and in any case ensure that in all circumstances the CCP meet the cover 2 requirement in Article 43 of EMIR without the re-used collateral. They will be described in more detail in a subsequent section 4.1.1.7.

4.1.1.7 Techniques of credit risk mitigation embedded in interoperability arrangements

95. Given that the risk of inter-CCP risk transmission might increase, for example in some of the situations described, it appears prudent that CCPs party to an interoperability arrangements consider the application of additional measures to mitigate risks not captured properly in the base margining methodology. An example thereof could be an add-on for concentrated positions or setting up funded facilities calibrated to a higher confidence level than the margining methodology. Some interoperable CCPs implement prudential elements directly to their margining methodology trying to reflect the embedded model risk. For example lower portfolio offsets address the risk of under-collateralisation described in case 4, add-ons for specific market events account for shortcomings in modelling market data time series in specific times of increased volatility or a special pool of cash can be set aside as liquidity reserve mitigating the risk resulting from collateral re-use provisions described in case 6.
96. Cases 4, 5 and 6 highlight the necessity of interoperable CCPs to know and understand the mutual risk management methodologies. Surveyed CCPs have established procedures to inform each other about all changes to risk models including in selected

cases provisions for material changes. This seems to be the optimal way for ensuring the mutual understanding of risk policies are in place.

97. A different approach to mitigate the risk would be for one interoperable CCP to collect inter-CCP margin not based on its standard margin model but in a way that ensures that the inter-CCP positions would be covered under extreme but plausible market conditions. This is, in fact, the guidance put forward in the Guidelines and Recommendations 3(b)(iii). This measure would significantly increase the size of inter-CCP margin. Inter-CCP margin, however, would continue be risk sensitive, i.e. the margin would only be collected if the risk is present.
98. Some CCPs which enter into interoperable arrangements take into account the exposure to the interoperable CCP when sizing their default fund as protection against a potential default of its interoperable counterpart. This would be the case if e.g. exposures from the interoperable arrangement exceed the second highest exposure of a clearing member under extreme but plausible market conditions. However, if the CCP does not include its credit exposures to the interoperable CCPs when sizing the default fund it should meet other arrangements (such as additional margin) in order to meet ESMA Guidelines and Recommendations, as clarified under the EMIR Q&As No 21.
99. Both solutions seem to have advantages and disadvantages. From a prudential perspective it can be argued that the resulting increase of the default fund in case of large inter-CCP positions as discussed above serves as protection for the interoperable CCP B in case of clearing member default at CCP A, e.g. under a scenario as discussed above. The resources CCP A has at its disposal to cover losses resulting from unwinding the positions of a defaulted clearing member will be higher if exposures of the interoperable CCP are reflected in sizing of the fund, this obviously only holds true if the inter-CCP exposures are higher than exposures of the second clearing member with highest exposures in stressed market conditions. However this also implies additional costs (through default fund contributions) for clearing members; even for clearing members not using the link.
100. In practice both approaches: sizing default fund including exposures stemming from interoperability arrangements, add-ons on inter-CCP margins or collateral pools dedicated uniquely to inter-CCP risks can be observed.

4.1.1.8 Conclusions on credit risk

101. The above scenarios are based on the assumption that systemic risk of interoperability arrangements is driven by potential under-collateralization of inter-CCP exposures. Parameters of the interoperability arrangements design having impact on the transmission risk have also been highlighted.
102. As explained in the different cases, there are scenarios under which under-collateralisation can materialise. However, ESMA Guidelines and Recommendations already envisage the way in which these cases should be addressed via inter-CCP arrangements. Furthermore, as already stated, those links and the corresponding

arrangements were approved by the relevant national competent authorities at the time each interoperable EU CCP was authorised through a college opinion and thus deemed compliant with EMIR. This combined with the evidence collected on the current CCP practices, confirm that EU CCPs have arrangements to adequately mitigate potential risk of under-collateralisation, even in cases where re-use is permitted to avoid increasing systemic risks

4.1.2 Quantitative assessment of existing CCP links

103. The quantitative responses submitted by interoperable EU CCPs provide insight into the size of inter-CCP positions and risks in absolute terms and also relative to the positions and risks towards clearing members of the interoperable CCPs. The following paragraphs provide a brief summary.

104. First we consider CCP membership. The tables provide the number of clearing members at the CCPs which are linked by an interoperable arrangement. The first line gives the number of clearing members, the second line shows how many of those are also a member of the interoperating CCP.

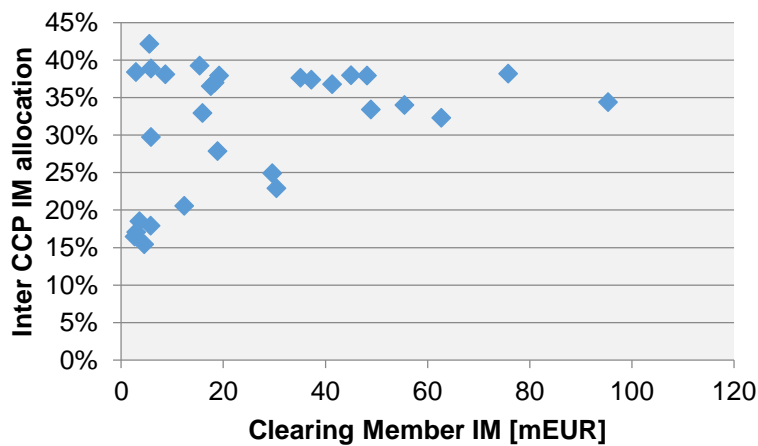
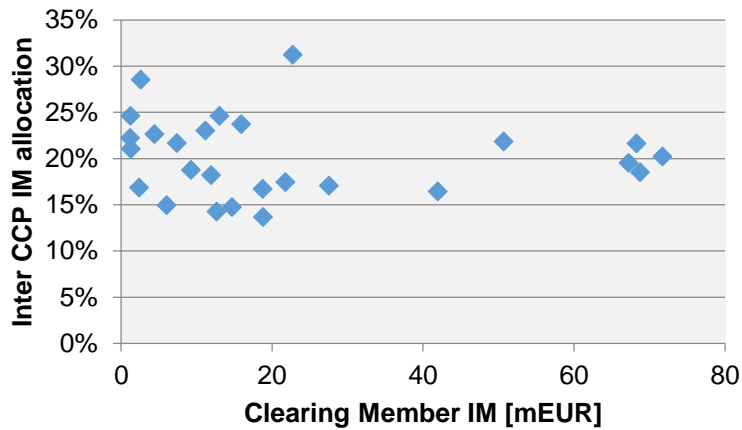
Interoperability arrangement 1	CCP A	CCP B
Clearing Members at CCP	45	38
Membership at interoperable CCP	17	17

Interoperability arrangement 2	CCP A	CCP B
Clearing Members at CCP	55	66
Membership at interoperable CCP	11	11

105. The numbers show that the overlap of membership at CCPs party to interoperability arrangements is still relatively high. In one of the surveyed interoperability arrangements larger international institutions tend to be clearing members at more than one CCP whereas smaller institutions are clearing members at the local CCPs. This is even clearer if the membership is measured based on the contribution to the default funds. In this particular case the ratio of clearing members of more than one interoperable CCP raises respectively from 25% to 50%. This could indicate that membership at a CCP provides benefits which cannot be substituted by access to an interoperable link and that the benefits prevail over the costs of contribution to the default fund and capital allocated by the clearing member. It could also indicate that the benefits of interoperable

arrangements have not been fully utilized yet and that the volume of transactions through existing interoperable links could increase in future.

106. A different view of the importance of interoperability arrangements and potential systemic risk embedded in the arrangements is provided by the size of net open positions, between the CCP and its clearing members and between the CCP and its interoperable CCPs and the size of initial margins for the respective exposures. This can be represented by the value of positions cleared by clearing members with the CCPs and value of the positions between the interoperable CCPs. Initial margin figures submitted by CCPs linked by the two interoperability arrangements represent the collateral called from respectively clearing members and CCPs for their interoperable exposures. Should the initial margin amounts for inter-CCP exposures be significantly higher relatively to the difference in exposure values the outcome would require further analysis as potential risk of under-collateralization might be present.
107. ESMA analysed the distribution of net open positions and initial margins (for 3 consecutive month-ends until October 2015) for clearing members and interoperable CCPs. Clearing member IM figures do not include inter-CCP margin contributions as the data submitted did not allow this analysis.
108. In case of one of the interoperability arrangements margins to interoperable CCPs are comparable in size to clearing member margins. Compared to net positions however, inter-CCP margins appear to be moderately higher, in relative terms. The ratio of margins to net open positions for interoperable exposures is slightly higher than for regular clearing member CCP exposures. However the shift is very limited in size with difference in the margin net open positions ratio of less than 5%. This can be fully explained by margin add-ons collected for additional risks as explained in chapter on Techniques of credit risk mitigation embedded in interoperability arrangements (section 4.1.1.7). This picture would be even more pronounced if the sum of inter-CCP margins was put in relation to the sum of CCP margins. Inter-CCP margins are then only a small fraction of the total collateral.
109. In case of the other interoperability arrangement the picture is quite different and the size of the inter-CCP initial margin is significantly higher than margins posted by the clearing member with the highest net open interest or initial margins following the interoperable CCP. However, this is a case in which the margin model of the interoperable CCPs is identical. It does not recognize any correlation driven offsetting effects. Hence the inter-CCP position is a sum of net positions of the clearing members using the link. The underlying market is for liquid cash settled instruments. The sum of initial margins posted by the clearing members is still 1.5 – 2 times higher than the inter-CCP requirements.
110. The two charts below provide insight into allocation of inter-CCP margin to clearing members for one of the two interoperability arrangements. Each point in the chart represents a clearing member. The horizontal axis represents the clearing member initial margin, the vertical axis shows the inter-CCP margin allocated to the clearing member as a proportion of the clearing member initial margin.



111. The observation here is that the relative proportion of inter-CCP margin is similar across clearing members. This would confirm the hypothesis that inter-CCP margin is allocated in proportion to the risk taken by the clearing member. It is not possible to deduct if the additional charge takes into account the positions across the link.
112. The above findings confirm that no significant risk of under-collateralization as defined in chapter 4.1 could be detected in the data provided by the interoperable CCPs. Although the interoperability arrangements surveyed by ESMA are of very different nature, the risk of inter-CCP collateral calls exceeding the collateral collected by CCPs from their clearing members can be considered as limited. There are also no material indications of significant concentrations of the interoperable exposures.

4.3 Operational risk

113. In addition to the prudential aspects other risks can impact central counterparties. The most relevant category encompasses “operational risk” which was mentioned as one of the key risks for FMIs in the PFMI. It refers to deficiencies in information systems or internal processes, human errors, management failures, or disruptions from external events resulting reduction, deterioration or breakdown of services.
114. Operational risk is not specifically dealt with in the Guidelines and Recommendations and is covered by provisions that refer to risks globally and through references to documentation clearly indicating processes and responsible persons as well as general policies, procedures and systems that should be in place and regularly monitored.
115. As stated above the centralisation of various functions within a CCP connected by an interoperability arrangement potentially increases efficiency but also can increase the operational risks to which an interoperable CCP is exposed, in particular because of more complex IT systems, dependencies to the interoperable CCPs and because of the more complex legal framework in which interoperable CCPs operate.
116. In any case, before starting operating the interoperable link the CCPs would need to perform the relevant tests and be subject to the scrutiny of the relevant competent authorities. Therefore, the incremental operational risks should not be material and, in any case, the corresponding mitigation tools envisaged in the regulation have been implemented to prevent increasing systemic risks.

5 Conclusion

117. When examining the different interoperable links between CCPs in the EU that fall under EMIR's current scope, they all date back, at least in their conception, to before the time when EMIR came into force. They were re-assessed in the context of the EMIR authorisation application process and since then none of them have raised any specific issues and some have seen their scope extended to new trading venues.
118. The benefits of interoperability are mainly the possibility to access more markets or trading venues without the need to plug into the local infrastructures and the netting efficiency since the lower the number of CCPs that a single clearing member needs to access, the higher the degree of netting, thereby the lower the aggregate credit risk.
119. Those benefits have to be weighed against the costs of those schemes which result mainly from the new risk they create and that the market participants have to finance whether directly or indirectly.
120. The main extra risk created for inter-operable CCPs is the inter-CCP credit risk which is the counterparty credit risk resulting from exposures between interoperable CCPs, i.e. the risk that one CCP, party to an interoperable arrangement, is not able to honour its financial obligations to its interoperable counterpart. The other types of risks are more straightforward in the sense that in nature they are already known to the CCP which use their traditional risk management devices to mitigate them.
121. The analysis performed in this report is based on the assumption that individual methodologies designed to size the resources of all CCPs party to the interoperability arrangement are robust, prudent and fulfil EMIR requirements, including the Guidelines and Recommendations thus excluding the re-assessment of default probabilities of individual CCPs. It leads to the conclusion that prudential tools have been developed by the CCPs to assess and to cover extra risks effectively, whether systemic or at individual level.
122. Besides, whilst defining quantitatively the final cost of mitigating the extra risks created by the interoperable links, at systemic or individual clearing member level, would be complicated, the qualitative analysis and the expansion of the scope of trading venues and the fact that some clearing members remain members of more than one interoperable CCP seem to indicate that overall interoperability is beneficial to the market community including primarily the clearing members.

6 Annex: Table of illustrations of main current EU interoperable links¹⁴

EQUITIES

Trading Venues (TVs)	TV country of registration	ICCPs	ICCP country of registration	CMs country of registration	Products type	Currencies	SSS/CSD	SSS/CSD country of registration
Aquis Exchange	UK	EuroCCP NV SIX x-clear LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	CHF, DKK, EUR, GBP, NOK, SEK, USD	Osterreichische Kontrolbank, Euroclear Belgium, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, NO, PT, ES, SE, CH
BATS Europe regulated markets	UK	EuroCCP NV SIX x-clear LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	AUD, CAD, CHF, DKK, EUR, GBP, JPY,NOK, SEK, USD	Osterreichische Kontrolbank, Euroclear Belgium, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, NO, PT, ES, SE, CH
Boerse berlin Equiduct	DE	EuroCCP NV SIX x-clear LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	CHF, DKK, EUR, GBP, SEK, USD	Osterreichische Kontrolbank, Euroclear Belgium, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, PT, ES, SE, CH

¹⁴ Please note that the Table are inserted for illustration purposes only and should not be deemed to be a representation from ESMA of services provided by the different CCPs.

Trading Venues (TVs)	TV country of registration	ICCPs	ICCP country of registration	CMs country of registration	Products type	Currencies	SSS/CSD	SSS/CSD country of registration
GETCO execution Services LLC	UK	EuroCCP NV SIX x-clear LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, USD	Osterreichische Kontrollbank, Euroclear Belgium, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, NO, PT, ES, SE, CH
LSE	UK	SIX x-clear LCH.Clearnet Ltd	CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs			
Nasdaq Nordic	DK, FI, SE	EuroCCP NV SIX x-clear LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	DKK, EUR, SKK	Euroclear, Finland, Euroclear Sweden, VP	DK, FI, SE
SIGMA X MTF	UK		NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	CHF, DKK, EUR, GBP, NOK, SEK, USD	Osterreichische Kontrollbank, Euroclear Belgium, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, NO, PT, ES, SE, CH
Smartpool trading Ltd	UK		NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	CHF, DKK, EUR, GBP, NOK, SEK, USD	Osterreichische Kontrollbank, Euroclear Belgium, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, NO, PT, ES, SE, CH

Trading Venues (TVs)	TV country of registration	ICCPs	ICCP country of registration	CMs country of registration	Products type	Currencies	SSS/CSD	SSS/CSD country of registration
Six Swiss Exchange	CH	SIX x-clear LCH.Clearnet Ltd	CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES				
Traina	UK	EuroCCP NV SIX x-clear LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	AUD, CAD, CHF, DKK, EUR, GBP, JPY, NOK, SEK, USD		AT, BE, DK, NL, FI, FR, DE, UK, IT, LU, NO, PT, ES, SE, CH
Turquoise Global Holding Ltd		EuroCCP NV SIX x-clear <i>(except for US, ES and ETF)</i> LCH.Clearnet Ltd	NL, CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	CHF, CZK, DKK, EUR, GBP, HUF, NOK, SEK, USD	Osterreichische Kontrollbank, Euroclear Belgium, Stredisko Cennych Papiru, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Keler, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, CZ, DK, NL, FI, FR, DE, HU, UK, IT, LU, NO, PT, ES, SE, CH
UBS MTF		EuroCCP NV SIX x-clear		BE, NL, FR, DE, UK, IT, LU, PT, ES	Shares, ETFs	CHF, CZK, DKK, EUR, GBP, HUF, NOK, SEK, USD	Osterreichische Kontrollbank, Euroclear Belgium, Stredisko Cennych Papiru, VP, Euroclear Nederland, Euroclear Finland, Euroclear France, Clearstream Banking Frankfurt, Keler, Euroclear UK & Ireland, Monte Titoli, Euroclear Bank, Verdipapirsentralen ASA, Interbolsa, Iberclear, SegalIntersettle, Euroclear Sweden	AT, BE, CZ, DK, NL, FI, FR, DE, HU, UK, IT, LU, NO, PT, ES, SE, CH

BONDS

Trading Venues (TVs)	TV country of registration	ICCPs	ICCP country of registration	CMs country of registration	Products type	Currencies	SSS/CSD	SSS/CSD country of registration
MTS Spa	IT	LCH.Clearnet SA CC&G	FR IT	UK, SP, FR, DE, LU, BE, NL, IT	Bonds	EUR	Monte Titoli (T2S)	IT
Broker Tec, ICAP, Tullet Prebon, ETCMS	UK	LCH.Clearnet SA CC&G	FR IT	UK, SP, FR, DE, LU, BE, NL, IT	Bonds	EUR	Monte Titoli (T2S)	IT

ETDs

Trading Venues (TVs)	TV country of registration	ICCPs	ICCP country of registration	CMs country of registration	Products type	Currencies	SSS/CSD	SSS/CSD country of registration
<i>LSE DM</i>	UK	SIX x-clear LCH.Clearnet Ltd	CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Options, futures	USD, GBP		
<i>Oslo Bors</i>	NO	SIX x-clear LCH.Clearnet Ltd	CH, UK	BE, NL, FR, DE, UK, IT, LU, PT, ES	Options, futures	NOK		