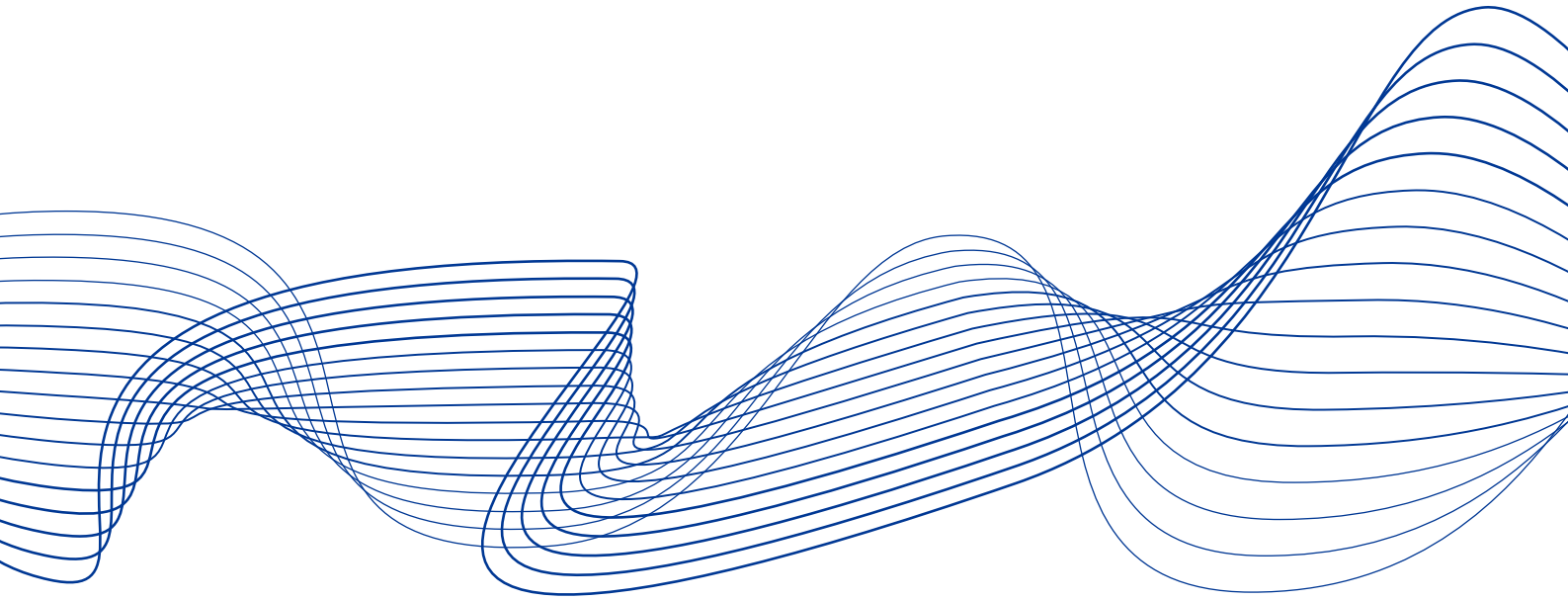
CCP interoperability arrangements

January 2019



ESRB
European Systemic Risk Board
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Executive summary

An interoperability arrangement is a link between central counterparties (CCPs) which involves the cross-system execution of transactions. There are currently five such arrangements in Europe. In total, four authorised CCPs located in the European Union (EU), plus a recognised third-country CCP in Switzerland and its Norwegian branch, have entered into such an arrangement. The links, which have been approved since the implementation of the European Market Infrastructure Regulation (EMIR), mostly cover the clearing of cash equities and government bonds, with one link covering the clearing of exchange-traded derivatives[1]. A previous report published by the European Systemic Risk Board (ESRB) in 2016 concluded that, although interoperability arrangements provide clearing members with increased opportunities for netting and lead to a reduction in outstanding gross exposures in the system, they are also believed to introduce complexity into the risk management of linked CCPs and to add a direct channel of contagion between CCPs.

This report expands on the previous ESRB report on interoperability arrangements by developing three main topics. First, it updates and enhances the analysis of existing arrangements in Europe. Second, it analyses the additional complexities of interoperability arrangements for derivatives. Finally, it provides a high-level analysis of the impact of the legislative proposal for a recovery and resolution framework for CCPs on existing and future interoperability arrangements, taking into account information which was not available at the time the previous report was drawn up.

The report emphasises that the legislative proposal should provide greater clarity as to how recovery and resolution tools would be applied for interoperable CCPs. The potential extension of interoperability arrangements beyond cash instruments depends, to a large extent, on the shape the final recovery and resolution framework for CCPs will take. The draft legislative proposal does not specifically address the treatment of interoperability arrangements and how the new rules and tools under the upcoming CCP recovery and resolution framework would apply to these arrangements. The ESRB would therefore welcome clarification on this issue.

In addition, the ESRB suggests clarifying in EMIR whether interoperability arrangements for derivatives could be approved and implemented and, if so, for which product types and under what conditions. An analysis of the features of derivatives links and the interdependencies with current provisions in EMIR as well as in the upcoming CCP recovery and resolution framework shows that interoperability arrangements for derivatives require additional safeguards. The absence of EMIR provisions relating to the admissibility of interoperability arrangements for derivatives has created legal uncertainty. This uncertainty should be removed, for example by specifying for which types of products and under what conditions interoperability arrangements for derivatives could be approved and established.

Keywords: central counterparties, systemic risk, financial stability, interconnectedness, interoperability.

[1] Subsequent to the approval of this report, Oslo Børs and the London Stock Exchange Derivatives Markets announced they were ending the interoperability arrangement covering derivatives between Six x-clear (Norwegian branch) and LCH Ltd as of June 2019 (see **press release** for further information).

JEL codes: G10, G18, G23 G28.

1 Introduction

CCPs play a key role in the financial system. CCPs manage post-trade risk and simplify a complex web of otherwise bilateral relationships between the counterparties to a trade. CCPs in the EU tend to specialise in the clearing of certain product classes. Consequently, financial institutions seeking to centrally clear different product types are, typically, clearing members or indirect participants at several CCPs.

Interoperability arrangements are links between two or more CCPs that involve a cross-system execution of transactions.[2] They allow clearing members of one CCP to centrally clear trades carried out with members of another CCP, without needing to be a member of the second CCP.[3] These links also introduce a direct channel of contagion between these critical nodes in the financial system, and the related risks must be evaluated in the context of a system that is already highly interconnected. In particular, there are indirect channels of contagion between CCPs when clearing members act in more than one CCP. Moreover, the central clearing landscape is highly interconnected, with a small number of participants providing key services for central clearing (e.g. Committee on Payments and Market Infrastructures (CPMI), Financial Stability Board (FSB), International Organization of Securities Commissions (IOSCO) and the Basel Committee on Banking Supervision (BCBS), 2017). This means that even in the absence of interoperability arrangements, channels already exist through which stress can propagate quickly between CCPs.

The ESRB provided a first assessment of the systemic risk and cost implications of CCP interoperability arrangements in a report published in 2016 (ESRB, 2016). This report gave an overview of the types of cross-CCP arrangements, the regulatory framework for CCP links under EMIR, the CCP interoperability arrangements in the EU in existence at the time, and the systemic risk implications of CCP interoperability arrangements. The report found that interoperability arrangements have a twofold impact on financial stability. On the one hand, it acknowledged that the arrangements allow clearing members to hold their open positions with one CCP instead of dividing them across different CCPs. This provides clearing members with increased opportunities for netting and reduces outstanding gross exposures in the system (as further explained in Section 2 of this report). On the other hand, interoperable links introduce complexity into the risk management systems of linked CCPs and also add a direct channel of contagion between CCPs. For this reason, the ESRB (2016) emphasised the need for monitoring of interoperability links and inter-CCP exposures, a sound risk management framework and adequate financial resources. The report also pointed to areas in which further work and clarification should be considered, including the treatment of interoperability arrangements in the recovery and resolution of CCPs and interoperability arrangements for over-the-counter (OTC) derivatives.

The report provides an update on the monitoring of interoperability arrangements and inter-CCP exposures, using recently available data published by CCPs. It provides more detailed analyses on areas that were discussed in ESRB (2016), i.e. interoperability arrangements for

[2] The definition of "interoperability arrangements" in Article 2 of EMIR corresponds to what is referred to as "peer-to-peer links" in the CPSS-IOSCO Principles for Financial Market Infrastructures (PFMIs).

[3] Annex 3 of European Post Trade Forum Report (2017) provides a definition according to which "interoperability" means that a trade could be executed between two parties, each using a different CCP, with each party being indifferent to the choice of the other party.

(OTC) derivatives and the treatment of interoperability arrangements during the recovery and resolution of CCPs. This may, in turn, help to inform ongoing legislative discussions regarding the recovery and resolution of CCPs and the related changes to EMIR. In addition, the report considers the risks and benefits related to cross-margining arrangements. It may also be useful for the analysis of cross-CCP interdependencies and could help to inform the future work of the European Commission on the systemic risk implications of interoperability arrangements in the EU.[4]

The remainder of this report is structured as follows. Section 2 provides the background to the economic functioning of interoperability arrangements. This includes an overview of central clearing with and without interoperability arrangements (Box 1) as well as an outline of the legal definitions relating to exchange-traded and OTC derivatives (Box 2). Section 3 considers the existing interoperability arrangements in Europe, while Section 4 provides an analysis of the financial stability benefits and risks of CCP links for derivatives. Section 5 describes the CCP rules and regulatory provisions for interoperability arrangements during the recovery and resolution process for linked CCPs. Box 3 gives an overview of the financial stability benefits and risks relating to cross-margining arrangements as another form of cross-CCP arrangement. Building on this analysis, Section 6 identifies areas in the EU regulatory framework that would benefit from a more detailed examination of interoperability arrangements.

[4] As outlined in EMIR 85(4), the European Commission "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".

2 Background

The establishment of interoperability arrangements was driven by demand from CCP users (i.e. clearing members and trading venues) rather than CCPs themselves. Following the establishment of an interoperability arrangement, clearing members do not have to hold clearing memberships at both of the linked CCPs. Demand for interoperability arrangements may therefore originate from some clearing members seeking more opportunities for netting across fungible or correlated products and aiming to reduce the need to hold multiple clearing memberships at CCPs that clear products traded on the same trading venue. For instance, by linking two CCPs that are established in different jurisdictions but act in the same trading venue, an interoperability arrangement enables market participants to access a larger pool of liquidity, while maintaining their membership at the local CCP. CGFS (2011) noted that "links could increase the scope for multilateral netting and reduce collateral demand for variation margin payments, as well as reduce the costs of multiple memberships. Thus, by bringing down the cost of clearing, they could promote greater use of central clearing and improve market liquidity". For small domestic markets in particular, a link between the domestic CCP and a global, multi-currency CCP could preserve the network advantages of concentrating clearing activities while offering "domestic authorities greater scope for managing episodes of financial stress than would a global offshore CCP." Before analysing the risks and benefits of CCP interoperability arrangements, this section now aims to provide the background to central clearing with and without interoperability arrangements, the functioning of interoperability arrangements on the basis of the product cleared and, finally, the classification of exchange-traded derivatives (ETDs) and OTC derivatives.

Box 1
Central clearing with and without interoperability arrangements

This box discusses three possible configurations: (i) the baseline, with one trading venue and a single CCP; (ii) the case of two CCPs entering into an interoperability arrangement; and (iii) the situation in which a preferred CCP model is in place. The box provides a reference model, in order to facilitate a better understanding of the more technical elements of the analysis in the rest of the report.[5]

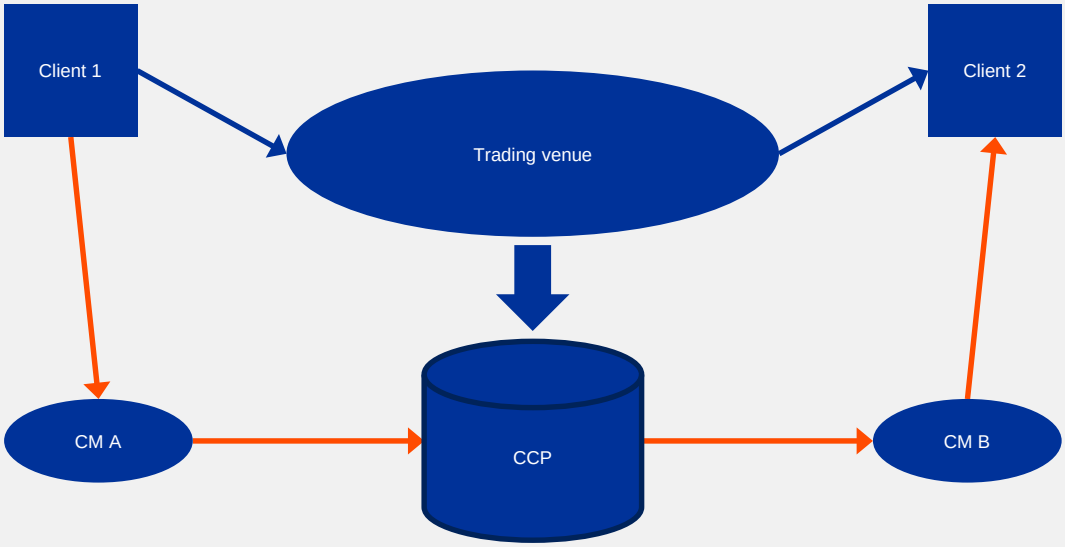
Case 1: Single CCP, single trading venue

Figure A below represents the situation in which all transactions are cleared by multiple clearing members (CM) at a single CCP. All transactions from the trading venue are novated to a single counterparty, the CCP which, by design, always holds balanced offsetting positions. In this case, clearing members maximise their netting opportunities and the CCP collects initial margin and default fund contributions from its clearing members. However, the collateral provided as initial margin is not available to the CCP, which can only use it in the event of the default of the clearing member, which posted the initial margin to cover any losses resulting from its default. In the absence of a default, the CCP may only invest any initial margin received in cash in a small range of safe assets, and by following tightly regulated investment policies.

[5] For a further analysis of different market structures in terms of links versus single CCPs, see Anderson, S. et al. (2013).

Figure A

Stylised example of clearing via a single trading venue and a single CCP



Source: ESRB.

In the figure, the blue lines show the direction of the trade flowing though the exchange. In this case, Client 1 is the seller of a transferable security, e.g. an equity or a bond, and Client 2 is the buyer. The transferable security is cleared by the CCP through the accounts of the clearing members servicing the two clients. The red lines show the direction of the post-trade flows in the settlement of the security. The flow of payments in exchange for the security (not shown in the picture) follows the same route, except in the opposite direction.

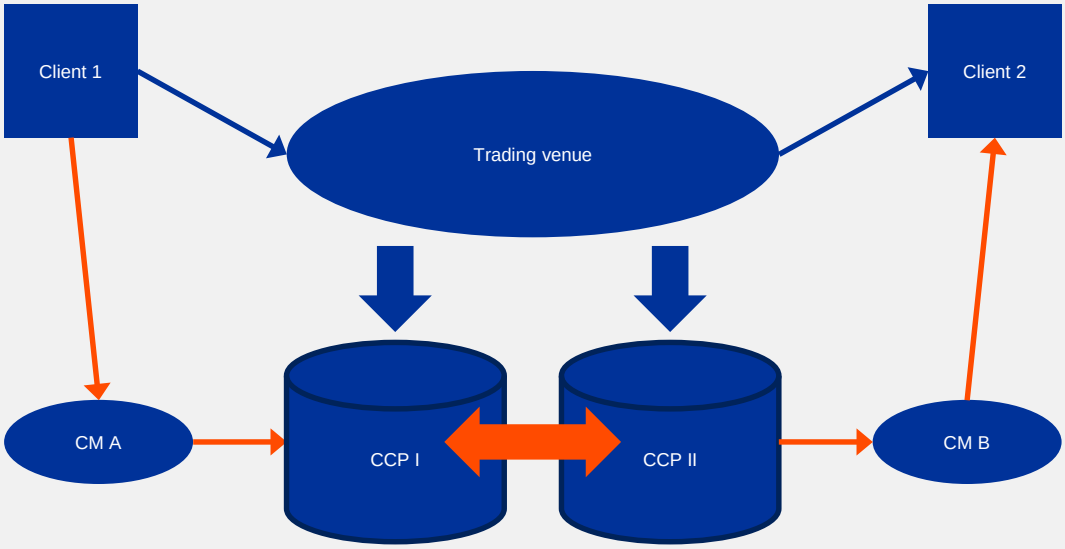
Case 2: Two CCPs with an interoperability arrangement

When a security is traded on an exchange that is serviced by different CCPs, a fragmentation of liquidity occurs, because the clients of the clearing members of one CCP can only trade on the exchange with other clients of the clearing members of that same CCP. The introduction of an interoperability arrangement between CCP I and CCP II, as in the stylised example in Figure B, illustrates how the CCPs may overcome this liquidity fragmentation by "opening" to each other. This allows all participants of the exchange to trade with each other without the need for clearing members to become members of both CCPs, and it provides more netting opportunities for the clients and clearing members.[6] In addition, it should foster competition and transparency across the interoperable CCPs, because clearing members can choose the CCP which offers better conditions, without losing out in terms of liquidity and access to clients on the trading venue.

[6] In order to exploit multilateral netting opportunities across CCPs without the need to establish interoperability arrangements, market participants could, in principle, compress derivative transactions. Compression is a post-trade netting technique through which market participants can modify their outstanding derivative contracts and create new contracts, in order to reduce the overall gross positions while avoiding any impact on the net positions (D'Errico and Roukny, 2017).

Figure B

Stylised example of clearing via interoperable CCPs



Source: ESRB.

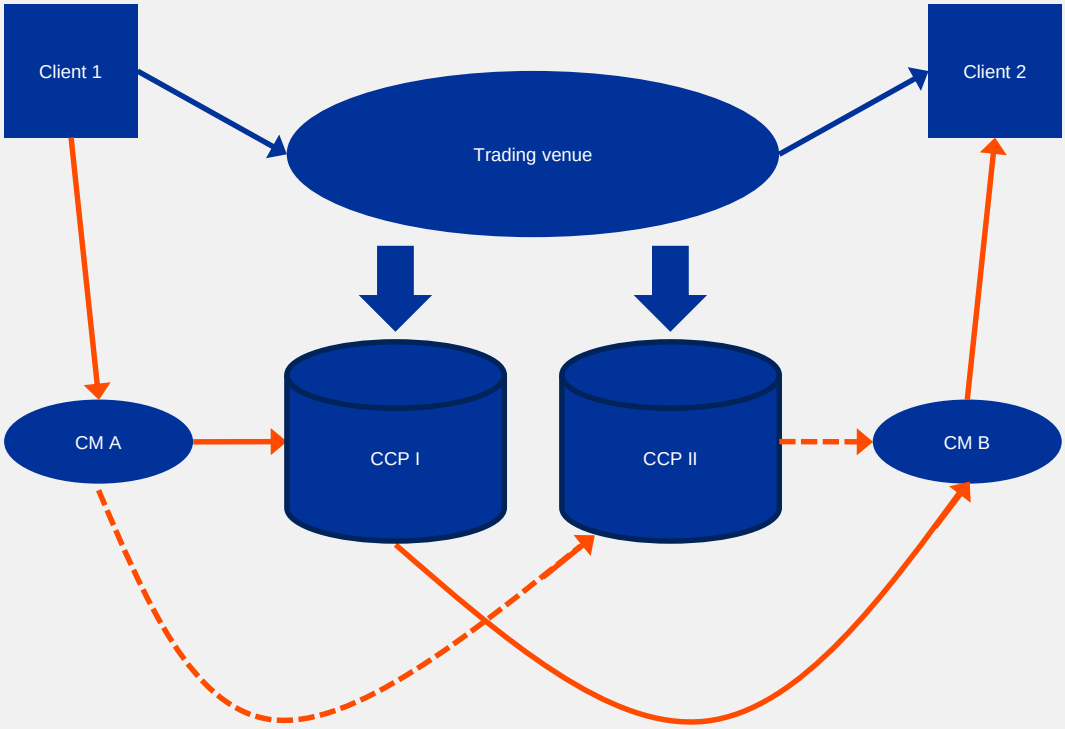
Interoperability arrangements need to be collateralised. For this purpose, CCPs typically fund the amounts that they have to post to each other by collecting "additional initial margins" from their clearing members. Moreover, to compensate for the fact that under EMIR, CCPs are legally prohibited from contributing to each other's default funds, the initial margin for transactions cleared via the interoperability arrangements is set higher than that applied to clearing members.

Case 3: Preferred CCP model as an alternative to clearing via interoperable CCPs

Under the requirements of the Markets in Financial Instruments Regulation (MiFIR) and the Markets in Financial Instruments Directive II (MiFID II), CCPs may request access to trading venues in order to offer clearing services. In order to grant a new CCP access, EMIR requires steps to be put in place to prevent market liquidity from becoming fragmented. In the absence of an interoperability arrangement, this may be achieved by ensuring that (at least some) clearing members are already (or become) members of both CCPs. In this manner, and provided the shared membership is sufficiently wide, counterparties trading on the venue are able to choose which CCP to clear through, thereby avoiding liquidity fragmentation. This is shown in Figure C, in which both clearing members can offer their clients the choice of clearing their trade through CCP I (solid line) or CCP II (dashed line). The difference, compared with an interoperability arrangement, is the need for dual membership among clearing members of the "new" CCP. While the preferred CCP model still increases competition between the CCPs and allows clearing members to avail themselves of netting opportunities, these benefits are limited by the capacity of the clearing members with dual membership and their ability to carry opposite positions on the same securities held at different CCPs.

Figure C

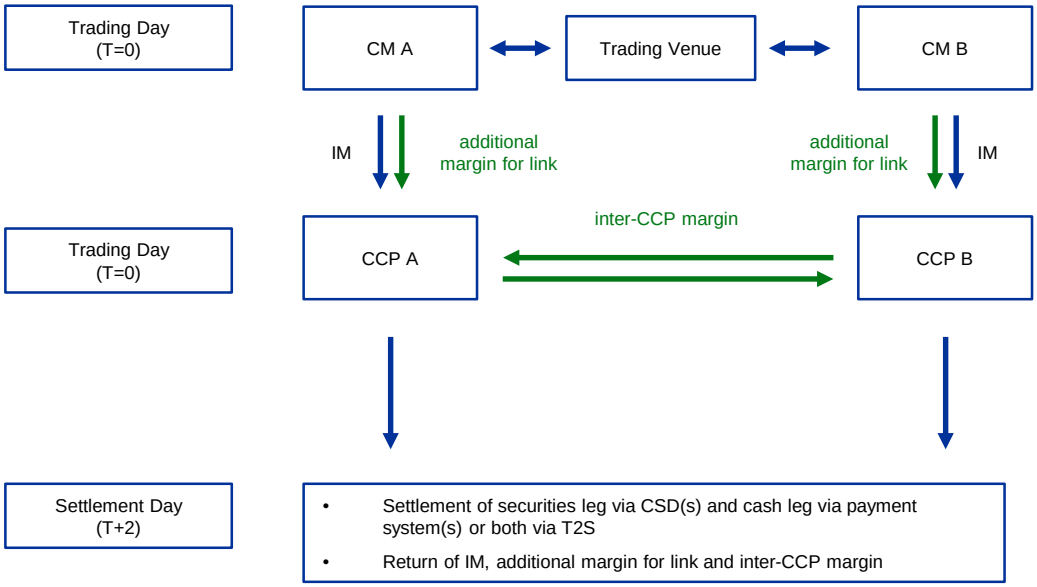
Stylised example of preferred CCP model



There are operational differences in the functioning of interoperability arrangements for transferable securities, such as bonds or equities, compared with derivatives. Transferable securities such as bonds only require the exchange of initial margin (and only variation margins in the case of longer-term transactions) between the two interoperable CCPs, and the finalisation of the transaction consists of the settlement of a financial instrument against cash by both CCPs in a central security depository (CSD) (Figure 1). Derivatives (both OTC derivatives and ETDs) – including those with physical delivery of the underlying at the maturity date – require the exchange of initial and variation margin between the two interoperable CCPs (Figure 2). The settlement consists of the exchange of a financial instrument (e.g. a credit default swap that foresees the delivery of a bond in a credit event) or a product (in the case of commodities) for physically settled derivatives or, in the case of cash-settled derivatives, the exchange of cash in potentially different currencies. The additional requirement of the daily variation margin exchange, coupled with the longer maturity of the contractual obligations of derivatives compared with the two-day settlement cycle for transferable securities transactions, adds operational complexity to the establishment of interoperability arrangements for derivatives.

Figure 1

Stylised example of interoperability arrangements for transferable securities (outright purchases of equities, ETFs and bonds)



Source: ESRB.

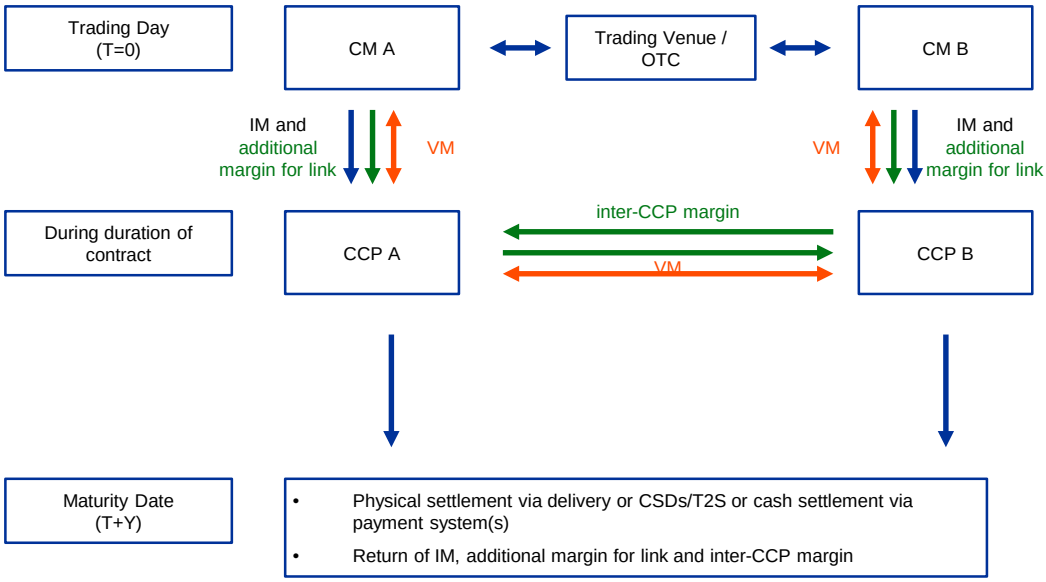
Notes: On trading day (T=0), clearing member A (CM A) and clearing member B (CM B) trade a transferable security via the trading venue. For the sake of simplicity it is assumed that both CM A and CM B are direct members of the trading venue. On T=0 the clearing members must post initial margin (IM) at the respective CCP A and CCP B and an additional margin for the link. The two CCPs exchange an inter-CCP margin to cover potential losses resulting from positions cleared via the interoperability arrangement. On settlement day (T+2), the transferable security is settled via CSDs and the cash resulting from the transaction is settled via payment systems. As an alternative, both the cash leg and the security itself could be settled via Target2Securities (T2S). In addition, the exchanged margin, including the CMs' initial margins and the inter-CCP margin (which includes the inter-CCP margin add-on), is returned to the clearing members.

The mechanics and the payment flows between CCPs in interoperability arrangements depend on the type of product cleared via the link. Interoperability arrangements between CCPs must be collateralised (Box 1). Clearing transferable securities via interoperability arrangements (Figure 1) usually only requires the exchange of inter-CCP margin between both CCPs. Some interoperability arrangements for transferable securities also include variation margin exchanges. For exchange-traded derivative transactions with longer maturities, the exchange of variation margin, which is also transferred via the interoperability arrangement, is an important feature of the risk management framework (Figure 2). Furthermore, there are settlement differences between physically settled and cash-settled derivatives.

CCPs' default management procedures also differ according to product type. The default management process can be triggered by the default of a clearing member or by the default of a linked CCP. In the case of transferable securities, managing the default entails settling outstanding transactions by buying or selling securities on the market. This also applies to ETDs, for which the CCP will try to rebalance the open positions by offsetting trades on the trading venue. By contrast, the default management process of a CCP clearing OTC derivatives relies on auctions or the forced allocation of the defaulting clearing member's portfolio among its surviving clearing members, as opposed to trading it on the open market. The different liquidity profile of instruments also adds to the complexity of managing interoperability arrangements for derivatives.

Figure 2

Stylised example of interoperability arrangements for derivatives



Source: ESRB.

Notes: On trading day (T=0), clearing member A (CM A) and clearing member B (CM B) execute a derivative transaction via the trading venue. For the sake of simplicity it is assumed that both CM A and CM B are direct members of the trading venue – as an alternative, the derivative could be traded OTC without the involvement of the trading venue. On T=0 the clearing members must post initial margin (IM) at the respective CCP A and CCP B as well as an additional margin for the link. For the duration of the derivative contract, the clearing members and the respective CCPs exchange the variation margin. The two CCPs exchange an inter-CCP margin to cover potential losses resulting from positions cleared via the interoperability arrangement and they also exchange the variation margin. On maturity date (T+Y), the derivative transaction is physically or cash-settled. In addition, the exchanged margin, including the CMs' initial margins and the inter-CCP margin (including the inter-CCP margin add-on) is returned to the clearing members.

The term "OTC derivatives" comprises many different financial instruments. It refers to a wide range of contracts, including interest rate swaps, swaptions, equity options, foreign exchange contracts and commodities derivatives, with tenors ranging from one day to 50 years. Typically, OTC derivatives contracts are negotiated bilaterally, and some of these contracts are compatible with central clearing. Within the group of contracts that can be cleared through CCPs, only those deemed sufficiently liquid and standardised are subject to mandatory clearing and the trading obligation under Article 29 MiFIR[7]. This heterogeneity of OTC derivatives makes it difficult to suggest adopting a "one-size-fits-all" approach for the set-up of the relevant market infrastructures, including the potential establishment of interoperability arrangements. What may be valid for highly standardised contracts may not be valid for less liquid contracts, even if both are centrally cleared.

Box 2
Exchange-traded and OTC derivatives

This box clarifies the use of the terms exchange-traded derivatives (ETDs) and over-the-counter (OTC) derivatives against a backdrop in which some OTC derivatives are traded on a trading platform and are centrally cleared.

7 For clarification of ETDs and OTC derivatives, please see Box 2.

A derivative is defined in Article 2(5) of EMIR as a financial instrument, as set out in points (4) to (10) of Section C of Annex I of MiFID II, and as implemented by Articles 38 and 39 of Regulation (EC) No 1287/2006. Under MiFIR, on the other hand, derivatives are defined in Article 2(1)(29) as those financial instruments defined in point (44)(c) of Article 4(1) of MiFID II and referred to in Annex I, Section C (4) to (10). However, these definitions do not distinguish between OTC derivatives and ETDs.

Article 2(7) of EMIR defines an "**OTC derivative**" or an "OTC derivative contract" as a derivative contract whose execution does not take place on a regulated market[8] or on a third-country market considered to be equivalent to a regulated market in accordance with Article 2a of EMIR. In addition, Article 2(1)(32) of MiFIR defines an "**exchange-traded derivative**" as a derivative that is traded on a regulated market or on a third-country market considered to be equivalent to a regulated market in accordance with Article 28 of MiFIR and which, as such, does not fall within the definition of an OTC derivative as defined in Article 2(7) of EMIR. Therefore, from a regulatory perspective, the discriminating factor which distinguishes an ETD from an OTC derivative is where the negotiation of the derivative contract takes place. If the contract is executed on a regulated market, it is considered to be an ETD, but in all other cases, including when a derivative is executed on a multilateral trading facility (MTF) or on an organised trading facility (OTF), it is considered to be an OTC derivative.

Taking a step back from the legal definitions, **ETD**s are generally understood to refer to derivative contracts that are highly standardised. Typically, ETDs have ISIN codes and public PRIIPS prospectuses. The archetypal ETD contract is a future contract which has a fixed underlying, lot size and expiry date, and is centrally cleared. Therefore, long and short future positions (for the same underlying and maturity) completely cancel each other out.

However, **OTC contracts**, even when traded on trading platforms and centrally cleared, retain unique features. While ETDs are standardised contracts with fixed parameters, counterparties to OTC contracts may agree bespoke maturities, amounts, and specific underlying according to their preferences and specific needs. The following example may help to illustrate the differences. Consider a FX forward contract and a FX future. The future has fixed maturities, typically March, June, September and December, and fixed underlying amounts (e.g. €125,000 for the EUR/USD contract). One can trade €1,000,000 of EUR/USD contracts with maturity in September 2018, but one cannot trade €975,000 for delivery on Wednesday 24 October 2018 on the futures market. In order to do that, one needs to enter into a bilateral OTC contract. Bespoke OTC contracts can be executed on a multilateral trading venue, but to be admitted to a regulated market these contracts need to be fully liquid, and therefore standardised.

Clearing and trading requirements are specified in Article 4 of EMIR and in Articles 28 and 29 of MiFIR. Article 4 of EMIR requires all OTC derivatives which have been declared in accordance with the clearing obligation pursuant to Article 5(2) of EMIR to be cleared, subject to a number of conditions. Article 28 of MiFIR stipulates that derivative contracts entered into by the entities

[8] A regulated market is defined by MiFID 4(1)(21) as a multilateral system operated and/or managed by a market operator, which facilitates the bringing together of multiple third-party buying and selling interests in financial instruments – in the system and in accordance with its non-discretionary rules – in a way that results in a contract, in respect of the financial instruments admitted to trading under its rules and/or systems, and which is authorised and functions regularly, in accordance with Title III of MiFID.

referred to therein, and which are subject to the clearing obligation pursuant to Article 4 of EMIR, must be executed on regulated markets, MTFs or OTFs. Article 29 stipulates that the operator of a regulated market must ensure that all derivative transactions executed on that regulated market are cleared by a CCP.

In summary:

1. ETDs are contracts that are exclusively traded on regulated markets. All ETDs are cleared by a CCP.

2. OTC derivative contracts can be cleared either bilaterally or centrally. Under certain conditions OTC derivatives may be subject to the EMIR clearing obligation. A subset of OTC derivative contracts subject to the clearing obligation may also have to be traded on a trading venue (an MTF or an OTF). However, these contracts, although centrally cleared and traded on a trading venue, are not deemed to be ETDs, and remain OTC derivatives. For a traded OTC to become an ETD, the trading venue would need to be a regulated market or a third-country market considered to be equivalent, in accordance with Article 28 of MiFIR and Article 2a of EMIR which, in turn, implies that the contracts would need to be highly standardised to be admitted to trading.

3. Derivative contracts which are not subject to the clearing obligation laid down in EMIR or MiFIR can, nevertheless, be centrally cleared, irrespective of where they are traded. Being traded on a trading venue is not a prerequisite for CCP clearing, and bilaterally traded contracts can still be admitted to clearing.

4. Derivatives which are not subject to the trading obligation, but which are still traded on trading venues such as MTFs and OTFs, do not have to be cleared at a CCP. However, market participants often choose to clear them through CCPs in order to benefit from the greater liquidity in centrally cleared markets. This is because central clearing simplifies the management of bilateral counterparty credit exposures between parties on a multilateral trading platform.

3 Overview of existing interoperability arrangements in Europe

This section presents an update of the overview of the current interoperability arrangements in Europe. It is based on newly available data published by CCPs under the Public Quantitative Disclosure Framework by the CPMI and IOSCO.

3.1 Current interoperability arrangements in Europe

Table 1 provides an overview of the existing interoperability arrangements in Europe and the financial instruments cleared via these links. There are five interoperability arrangements in Europe, linking four authorised EU CCPs (EuroCCP in the Netherlands, CC&G in Italy, LCH Ltd in UK and LCH SA in France), and a recognised third-country CCP (the Swiss SIX x-clear) and its Norwegian branch (SIX x-clear NO, hereafter referred to as SIXX NO)[9]. Three CCPs (CC&G, LCH SA and SIXX NO) have only one interoperable arrangement, two CCPs (EuroCCP and SIX x-clear) have two arrangements and one CCP (LCH Ltd) has as much as three.

Table 1
Overview of existing interoperability arrangements in Europe

Interoperability arrangement	CC&G – LCH SA	EuroCCP – LCH Ltd	EuroCCP – SIX x-clear AG	LCH Ltd – SIX x-clear AG	LCH Ltd – SIXX NO
Financial instruments cleared	Italian government bonds (cash and repos)	Cash equites and ETFs	Cash equites and ETFs	Cash equities and ETFs	Cash securities (equities and bonds), exchange-traded equity derivatives, repos, securities lending.

Source: ESRB survey.

These interoperability arrangements typically cover one asset class per link, with cash equities being the most common instrument. One link (SIXX NO – LCH Ltd) covers various asset classes, including exchange-traded equity derivatives, while another link (LCH SA – CC&G) only covers government bonds. A more detailed overview of existing interoperability arrangements may be found in ESRB (2016)[10]. Currently, only the interoperability arrangement between SIXX NO and LCH Ltd covers exchange-traded equity derivatives, and there is no link for OTC derivatives in Europe. At a global level, the few links for derivatives only allow for the clearing of ETDs and, at the cut-off date for this report, there is no active CCP link for the clearing of OTC derivatives.

[9] Subsequent to the approval of this report, Oslo Børs and the London Stock Exchange Derivatives Markets announced they were ending the interoperability arrangement between Six x-clear (Norwegian branch) and LCH Ltd with regard to derivatives as of June 2019 (see **press release** for further information).

[10] The existence of cross-CCPs systems to clear trades on a cross-border basis is not a novelty. As BIS (1997) describes, several such arrangements were already in operation at the end of the 1980s: "As exchanges and their clearing houses have looked to cross-border alliances to boost trading volumes and to provide clearing members with secure and efficient means of trading and settling contracts in multiple time zones, several links between clearing houses in different countries have been developed and more are planned".

The main factor driving interoperability is the possibility of consolidating the open positions of trading participants and/or clearing members in the same products at one CCP.[11] Interoperability arrangements therefore reduce the fragmentation of these positions. In practice, this is not always the case and, even in the presence of interoperability arrangements, clearing members may decide to hold dual memberships. For example, of the 18 general clearing members at the SIX Swiss Exchange, two are clearing members at both SIX x-clear and LCH Ltd.[12] Another driving factor is the aim of linking a smaller market to a larger market, which may potentially be fuelled by regulatory or technical requirements that hinder or even impede direct participation at a foreign CCP (CGFS, 2011 and Gregory, 2014).

In comparison with other jurisdictions, the EU has a relatively high density of CCPs. At the cut-off date for this report, 16 EU CCPs and 32 third-country CCPs had been recognised to offer clearing services in the EU. As a consequence, 48 CCPs are authorised to provide clearing services to EU counterparties. The concentration in central clearing varies between individual asset classes, including (OTC) derivatives. With regard to OTC derivatives subject to the clearing obligation, most asset classes are cleared by more than one CCP. By contrast, in the USA 13 CCPs are registered at the CFTC (four of which are established in Europe) and four CCPs at the SEC, mostly acting as dominant CCPs for individual asset classes. Therefore, although the economic rationale for CCP links seems quite limited in the USA, the same conclusion cannot be reached for the EU.

From January 2018 onwards non-discriminatory access relating to trading venues and CCPs under the provisions of the MiFIR might have represented a possible new driving factor. However, based on publicly available information, there had been no requests for new CCP links by the cut-off date for this report. While several trading venues for ETDs and CCPs have asked to be exempted from the access provisions until June 2020[13], some stock trading venues (Deutsche Börse, Borsa Italiana and Nex BrokerTec) have accepted further authorised EU CCPs offering clearing services. In these cases a "preferred CCP model" is used, meaning that a trade is only processed by a new CCP if both parties have flagged this new CCP as their preference. Otherwise, the trade is cleared by the incumbent CCP. In either case, it is a prerequisite that the two trading counterparties must be clearing members at the same CCP (see Box 1 of this report for more details of the preferred CCP model).[14]

The CCP interoperability landscape in Europe has not changed since the EMIR authorisation of the first CCP in 2013/2014 and the latest analysis in ESRB (2016). However, it is not impossible that, in the short or medium term, the driving factors mentioned above could induce demand for clearing links by CCPs or their constituencies, fed by the search for further netting efficiencies. A hint of such potential demand emerged in the context of the proposed merger between Deutsche Börse and London Stock Exchange Group, since one economic justification was the intention to establish some kind of cross-margining arrangement.[15] It can also not be ruled out that

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11 This is also described in the report of the European Post Trade Forum (2017): "When CCPs were first introduced, it was intended that all trades on a platform would be channelled to a single CCP for clearing. […] This is no longer true with competitive clearing, where multiple CCPs clear for the same trading platform".

12 The clearing members with memberships at both CCPs are Caceis Bank S.A. and KAS Bank N.V. See **list of general clearing members**.

13 See the **list of trading venues and CCPs benefiting from a transitional exemption from the access provisions under MiFIR**.

14 Information on the cooperation between the stock exchanges and CCPs can be found in the following links: **EuroCCP – Deutsche Börse**; **EuroCCP – Borsa Italiana**; **BME Clearing – Nex BrokerTech**.

15 More information on the **planned merger between Deutsche Börse and London Stock Exchange Group**.

institutional changes such as the UK's withdrawal from the EU might influence the structure of financial markets in Europe, including demand for cross-CCP systems and links between CCPs.

3.2 Clearing activity via interoperability arrangements

Data published by CCPs under the CPMI-IOSCO Public Quantitative Disclosure Framework (PQD) facilitate an analysis of clearing activity via existing interoperability arrangements. In this section, interoperability arrangements in the EU, the European Economic Area (EEA) and Switzerland are presented over various points in time.[16] In general, the framework includes data on the value of trades cleared through each link, the financial resources (including initial margin) provided and collected for each link, as well as the results of back-testing of initial margin coverage.

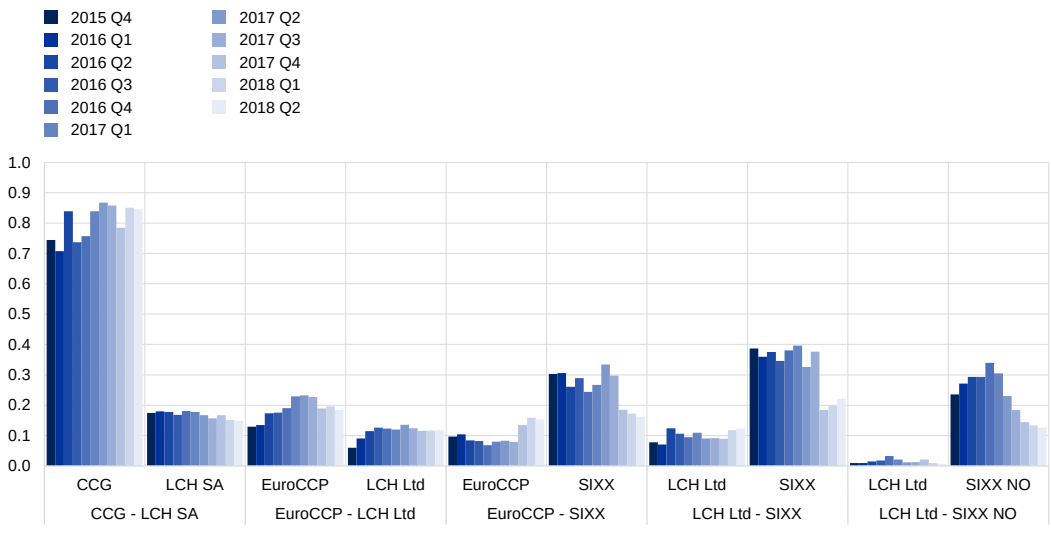
Overall, it is observed that:

- interoperability arrangements are more relevant for some CCPs in terms of the value of trades cleared through the link (such as CC&G and SIX x-clear) than for others;
- the highest share of volume cleared via interoperability arrangements is observed in the link between CC&G and LCH SA;
- EuroCCP's link with LCH Ltd has become increasingly important since Q4 2015 in terms of the value of trades cleared through the link.

Chart 1

Value of trades cleared through each link as a share of total value of trades or total notional values cleared in a certain service

(quarter-end, ratio)



Source: Data published by CCPs under 20.1.1 CPMI-IOSCO PQD.

[16] However, the consistency of data reporting methodologies between CCPs cannot be guaranteed.

Chart 1 shows the value of trades cleared through each link as a share of the total trade value in a particular clearing service, for each CCP. This gives an indication of the significance of each link for the CCP in the respective clearing service. The share of trades cleared via interoperability arrangements ranges from an average of 1.5% (the percentage of LCH Ltd's equity clearing channelled through its link with SIXX NO) to an average of 80.3% (the percentage of CC&G's fixed income clearing channelled through its link with LCH SA) over the period from the fourth quarter of 2015 to the second quarter of 2018, thus showing heterogeneity across the links. The comparison with CC&G (an average of 80.3%) and LCH SA (an average of 16.8%) in terms of their link also shows that the share of trades cleared via the same link can differ significantly across CCPs, depending on CCPs' overall clearing activity and the spectrum of clearing services they offer. In general, this share was stable for the available time period from the fourth quarter of 2015 to the second quarter of 2018. For CC&G, most quarters in 2017, and the second quarter of 2018, produced figures of over 80%, showing the increasing importance of the link to the respective clearing service. The clearing members of LCH SA make significant use of the link to approach the Italian government bond market, and only around 20% of the trades cleared by CC&G in this service are between CC&G's clearing members. For EuroCCP, the link with LCH Ltd has become increasingly important over the full available time frame. For SIX x-clear, the two interoperable CCPs represent together, on average, 57.9% of the total trade value in this clearing service (25.6% for EuroCCP and 32.3% for LCH Ltd).

Chart 2a gives an overview of the initial margin provided to each linked CCP. In line with the above, it may be clearly observed that the initial margin provided is significantly higher for the CC&G – LCH SA link than for the other links. To provide more detail, this is further split into Chart 2b (which shows only the CC&G and LCH SA link) and Chart 2c (which shows the other links). It can be observed that the provision of initial margin varies over time – this may be owing to several factors, such as changes in price volatility or in clearing volumes via the interoperability links.[17]

[17] In the third quarter of 2016, the provision of initial margin dropped in all links, which might be owing to a decline in clearing activity, as the date of the end of the quarter fell on a Friday.

Chart 2a

Initial margin provided to each linked CCP

(EUR millions)

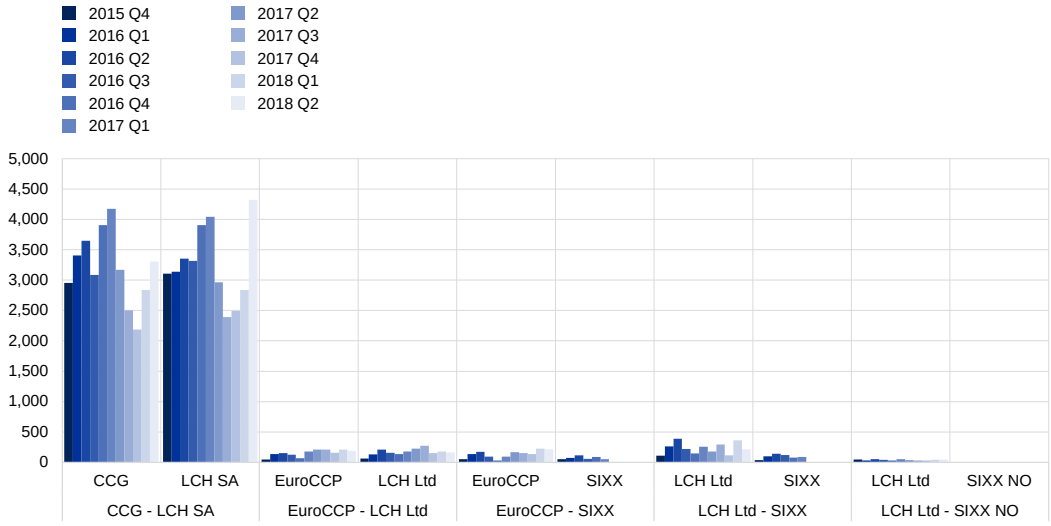
Source: Data published by CCPs under 20.2.1 CPMI-IOSCO PQD.

Chart 3 shows the initial margin collected from each linked CCP, and provides a similar picture to the above. The initial margin collected is significantly higher for the CC&G-LCH SA link and varies over time for the different interoperability arrangements. Considering both the chart on initial margin provided and the chart showing initial margin collected, and assuming that initial margin could serve as a proxy for clearing activity, the link between CC&G and LCH SA appears to be more actively used than the other links, also taking into account the size and turnover of the markets served by the link.

Chart 3

Initial margin collected from each linked CCP

(EUR millions)



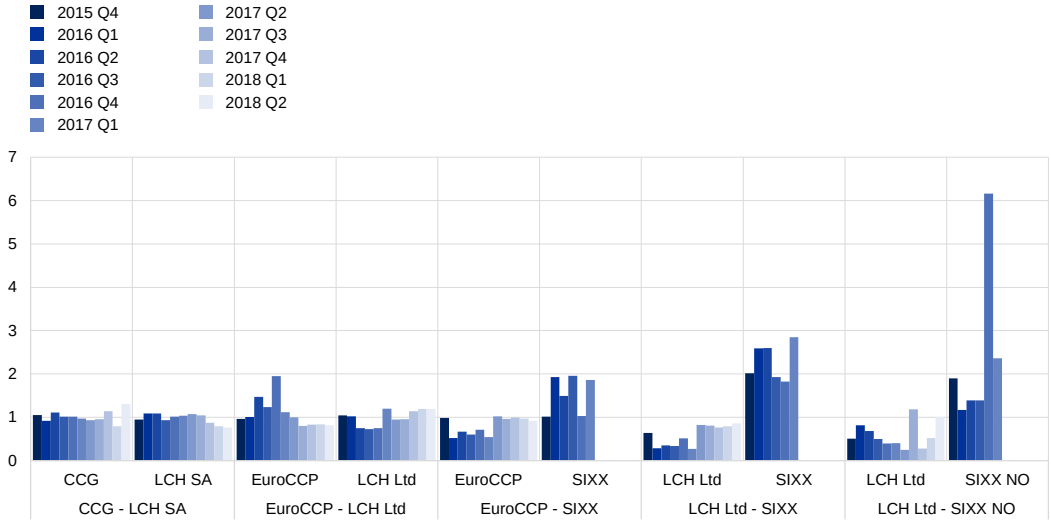
Source: Data published by CCPs under 20.3.1 CPMI-IOSCO PQD.

Chart 4 shows the ratio between initial margin provided and initial margin collected for each linked CCP. A value over 1 means that more initial margin is being provided than collected by the interoperable CCP, while a value of less than 1 means the opposite, i.e. that more initial margin is being collected than provided. The data source does not specify whether “initial margin collected” refers to the initial margin requirement that one CCP has called from the interoperable CCP, or the initial margin actually provided, which could contain voluntary over-collateralisation. For an ordinary financial instrument, a CCP typically requires the same amount of initial margin from both the buyer and the seller of a security, because the risk of losses due to market price fluctuations is, in principle, symmetric in both directions. This should also hold true for clearing over an interoperability arrangement if the risk management models of both CCPs are equal, or at least very similar. In special cases, e.g. for options, the initial margin requirement is different for the buyer and the seller. Hence, a value greater than 1 could be interpreted as a case in which the risk management models are, to a certain extent, different and therefore call for different levels of margins for the same risk position. In the case of the derivative link between LCH Ltd and SIXX NO, which includes the clearing of options, the difference may be seen as reflecting the directionality of a risk flow from the members of one CCP to the members of the other.

Chart 4

Initial margin provided over initial margin collected

(in shares)



Source: Data published by CCPs under 20.2.1.and 20.3.1 CPMI-IOSCO PQD.

The PQD data include the number of times over the past 12 months that the coverage provided by the margin and equivalent financial resources held against the linked CCP fell below the marked-to-market exposure to that CCP and, hence, gives an indication of the collateralisation of the link. While most CCPs did not report any cases, Six x-clear reported that over the past 12 months the coverage held against EuroCCP had fallen below the marked-to-market exposure at least once, and that held against LCH Ltd had fallen below the marked-to-market exposure to LCH Ltd twice.

4 Systemic risk analysis of interoperability arrangements for derivatives

4.1 Regulatory framework for CCP interoperability arrangements

In central clearing, a CCP is in possession of complete information on the trading positions of its clearing members.[18] As long as no clearing member defaults, a CCP has a balanced book and is not exposed to market risk. However, a CCP guarantees the fulfilment of the cleared transactions by managing clearing member defaults and is, therefore, exposed to counterparty risk. To manage counterparty risk, a CCP requires its clearing members to post margins and make default fund contributions. In the case of an interoperability arrangement, each CCP no longer enjoys complete transparency with regard to the dispersion of the trading positions among the participants acting in the markets it serves, since a portion of these participants are "represented" (and therefore "masked") by the interoperable CCP which is responsible for them. This issue could, in principle, be addressed by information-sharing mechanisms, but it may be assumed that CCPs competing in a market would not share information on clearing members for legal (e.g. breach of confidentiality) and commercial reasons.

CCP links, including CCP interoperability arrangements, are covered by the international and EU regulatory frameworks. At international level, Principle 20 of the Principles for Financial Market Infrastructures (PFMI) refers to CCP links. EMIR has established a regulatory framework for the authorisation and risk management of interoperability arrangements in the EU. Article 1(3) of EMIR stipulates that Title V of EMIR only applies to transferable securities and money market instruments. Title V (Articles 51 to 54) of EMIR sets out the approval process and risk management features of interoperability arrangements, including the provision of margins between CCPs. Article 54 of EMIR states that interoperability arrangements should be subject to the prior approval of the competent authorities of the CCPs involved, and that these CCPs must be authorised under Article 17 of EMIR or be recognised under Article 25 of EMIR before a request for the approval of the interoperability arrangement may be sent to national competent authorities. Each CCP poses a counterparty risk to the interoperable CCP and is, therefore, required to post margin to the other CCP. However, to prevent direct contagion from one CCP to the other, the EMIR provisions prohibit CCPs from contributing to each other's default funds and they do not, therefore, participate in the default waterfall of the interoperable CCP. The Commission Delegated Regulation No 152/2013 states that interoperable CCPs are not required to hold capital for trade exposures which arise under an interoperability arrangement, provided that the requirements of Articles 52 and 53 of EMIR are fulfilled. The regulatory framework of EMIR is complemented by the guidelines and recommendations issued by the European Securities and Markets Authority (ESMA) in 2013, following consultation with the European System of Central Banks. ESMA (2013) explains that interoperability in respect of derivative instruments (including OTC derivative instruments) is permitted under EMIR, and that the provisions of Title V do not apply to such arrangements.

[18] This refers to the trading positions cleared via this CCP.

The current regulatory framework in the EU does not clearly cover interoperability arrangements for derivatives, including OTC derivatives. Recital 73 of EMIR states that the scope of interoperability arrangements should be restricted to transferable securities and money market instruments "given the additional complexities involved in an interoperability arrangement between CCPs clearing OTC derivative contracts". ESMA has published a report on extending the scope of the EMIR requirements relating to interoperability arrangements to cover transactions in classes of financial instruments other than transferable securities and money market instruments (ESMA, 2015). In that report, ESMA proposed – in addition to clarifying that the current regulatory framework would not, in principle, prevent the establishment of CCP links for derivatives[19] – extending the scope of the EMIR requirements for interoperability arrangements to cover ETDs, although not OTC derivatives, based on a cost and benefit analysis. In addition, ESMA provides two main justifications for restricting the extension of that scope to ETDs at that stage. First, ESMA does not wish to incentivise the establishment of OTC derivative links at that stage, owing to the complexities associated with the risk management of such links. Second, it believes that it would not be prudent to include OTC derivative links within the scope of EMIR before the potentially uncertain effects of the clearing obligation have been assessed. As at the cut-off date for this report, the European Commission has not decided whether to endorse such a proposal, and the first annual report foreseen by Article 85(4) is still outstanding. Through its proposal for amending EMIR under its Regulatory Fitness and Performance (REFIT) programme, the Commission is limiting the EMIR review to specific aspects, and does not anticipate any changes to the regulatory framework for interoperability arrangements.

The legal uncertainty surrounding the regulatory framework on interoperability arrangements for derivatives may have implicitly disincentivised the demand for such links. This uncertainty also relates to how interoperability arrangements are defined in EMIR. The regulation currently states that an interoperability arrangement "means an arrangement between two or more CCPs that involves a cross-system execution of transactions". However, the notion "execution of transactions" could lead to confusion with "trade execution". This is because there is no central system for the execution of transactions in the case of OTC derivatives – at least if they are still traded bilaterally and not on an MTF or an OTF. The legal definition may therefore fail to cover interoperability arrangements for such products. Hence, if interoperability arrangements were allowed for the broad range of OTC derivatives, the EMIR provisions might have to be amended and a different expression, e.g. "transaction processing" or "cross-system clearing", would be preferable. However, if OTC derivatives links were only allowed for those OTC derivatives that are subject to the trading obligation, these amendments would not be necessary as such instruments are, by definition, traded on a trading venue. Furthermore, there seems to be no possibility that an interoperability arrangement for derivatives would involve more than two CCPs at the same time.

[19] ESMA (2015) states: "Although currently EMIR does not apply to interoperability arrangements for (OTC) derivatives, the Guidelines and Recommendations also apply to interoperability arrangements on (OTC) derivatives. Given that EMIR does not ban interoperability arrangements on (OTC) derivatives, NCAs and ESMA agreed at the time of the adoption of the Guidelines and Recommendations that should interoperability arrangements on (OTC) derivatives arise, the Guidelines and Recommendations should apply as a basis for NCAs' risk assessment. However, no specific recommendation was developed either for (OTC) derivatives' interoperability arrangements or for specific risks arising from these arrangements."

4.2 Possible risks to financial stability from interoperability arrangements for derivatives

4.2.1 Day-to-day risk management of CCP interoperability arrangements

ESRB (2016) points out some general challenges for the risk management of CCP interoperability arrangements. In particular, interoperability arrangements may generate inter-CCP contagion risk arising from inter-CCP exposures and lead to the under-collateralisation of inter-CCP exposures if these are not adequately monitored and margined. They could also create operational risks and additional complexities in the risk management frameworks for CCPs.

Derivative contracts are different from securities and money market instruments – which needs to be addressed by CCPs' risk management frameworks. Compared with transferable securities and money market instruments, derivative contracts often have longer maturities and more complex default and risk management processes. These differences are reflected in the size of the default waterfalls of CCPs clearing securities versus those of CCPs clearing derivatives. The former are often in the region of hundreds of millions or single-digit billion euro, whereas the latter may amount to dozens of billion euro.

The literature suggests that interoperability arrangements for derivatives add further complexity to the risk management of CCPs. The European Post Trade Forum (2017) states that "[i]nteroperability between derivatives CCPs raises significant questions of financial stability". However, it does not specify further which financial stability risks it has considered in detail. CGFS (2011) points to a number of risks related to interoperability arrangements. It states that "a linked network of CCPs might recreate some of the interconnection risks that central clearing is intended to address – including through credit exposures as well as legal and operational risks. […] Links among CCPs clearing OTC derivatives remain a new and untested area for markets and policymakers. […] In order to mitigate the risks created by links, linking arrangements should be transparent to the greatest extent possible. Authorities should encourage industry participants to propose how they intend to find solutions for the legal, financial and operational risks that can arise from links and cross-margining practices."

Since derivative contracts have a longer maturity, CCPs are required to manage risks arising from interoperability arrangements for derivatives over a longer period. In securities clearing, CCPs' exposure is limited to the (usually) short timespan between trading and settlement, while the duration of the reciprocal exposure can be long for repo contracts. Derivative transactions typically generate longer-maturity exposures than transferable securities settlement and money market instruments (e.g. 37% of interest rate swaps cleared by LCH Ltd have a tenor of longer than two years, and some have a maturity of 50 years). In the case of an interoperability arrangement for derivatives this implies that each linked CCP has a book of transactions (with maturities that are significantly longer than they are for securities settlement) open with the other CCP at all times. Therefore, the notional amount of the outstanding contracts cleared through a link is likely to grow over time, as new contracts are added while those entered previously have not yet matured. To account for the possibility of an interoperable CCP defaulting, CCPs will need to manage the risk arising from interoperable arrangements for derivatives for a longer period of time than for other

financial instruments. When CCPs calculate their prefunded resources they must also compare the inter-CCP exposure with the trading liquidity in the market. Since the daily trading volume of derivatives (the flow) is usually lower than it is for other financial instruments, which can have a negative impact on the default management process of interoperable CCPs, they may require higher initial margin amounts and default fund contributions from their own clearing members, as well as additional margins for the inter-CCP exposures.

The exchange of variation margins through an interoperability arrangement for derivatives could involve larger amounts, which has implications for CCPs' liquidity. The linked CCPs could either choose to wait until they have received the variation margin from the interoperable CCP before paying it to their clearing members (possibly resulting in a significant time lag and, as a consequence, a significant liquidity risk at the various clearing members waiting for these payments) or they could pre-fund the variation margin outpayment (in which case they would need protection against the additional liquidity risk). The situation could become even more complicated if the CCPs were located in different time zones – although this does not seem to be relevant in Europe.

CCPs in an interoperability arrangement cannot prevent a build-up of directional positions in the inter-CCP exposure. A build-up of directional positions could, for example, occur if some clearing members took directional positions on derivatives with a longer maturity with the clearing members of the interoperable CCP, but then hedged these using transactions with other clearing members of their own CCP. Depending on its size, a large inter-CCP exposure would require an additional concentration margin (Lewis and McPartland, 2016) which would need to be funded by the respective clearing members.

CCPs in an interoperability arrangement may accept different sets of collateral, which could lead to higher operational complexities. In line with Article 46 of EMIR, CCPs only accept highly liquid collateral with minimal credit and market risk (e.g. cash, government bonds, covered bonds and certain equities). However, and especially with regard to CCPs that clear derivatives, the two CCPs in an interoperability arrangement may accept different sets of collateral from their clearing members. The CCPs could either agree on a common list of collateral (which would entail adaption costs for some clearing members/markets) or they could rely on so-called collateral transformation services to exchange the collateral received from their respective clearing members into collateral that can be accepted by the other CCP for the inter-CCP exposure. Collateral transformation services would introduce new dependencies on the providers of such services, as well as operational complexities.

4.2.2 Coping with a clearing member default via a link

Beyond day-to-day business challenges, there are specific challenges for the default management process in the case of interoperability arrangements for derivatives. In the event of a clearing member default, a CCP clearing securities would buy or sell the securities in the market or, for large positions, negotiate bilaterally with other market participants to facilitate the close-out of the outstanding positions. By contrast, a CCP clearing derivatives would normally rely on its surviving clearing members to manage a clearing member default. These clearing members are required to delegate a number of traders to the CCP to help it to become an active market participant, and

auction off the open positions. If two CCPs established an interoperability arrangement, some of the clearing members might discontinue their dual membership and would only be liable to take part in the default management process for a transition period, e.g. for 90 days, following the cancellation of their membership. After that, a CCP could only rely on its remaining membership, and not a wider membership, to rebalance its unmatched book if a member defaulted, since a part of the market would only be accessible via the interoperable CCP. One possible way to address this concentration risk would be to invite the clearing members of the interoperable CCP to the auction process, in order to increase the number of bidders. However, for this to be technically and legally feasible, there would probably need to be a prior connection and relationship between the clearing members and the interoperating CCP in which they do not participate. This would defeat the original purpose of the interoperability arrangement, unless specific forms of "dormient" membership were provided for by the interoperating CCPs. Another possible solution could be for the interoperable CCP to actively participate in the auction of the other CCP and to pass on the positions acquired to its own clearing members through a second auction or a forced allocation. However, active bidding in an auction would expose the CCP to significant market risk, unless clear action/allocation rules were stipulated in the CCP rulebook to prevent uncollateralised exposures from materialising. It would be beneficial for CCPs to constantly exchange information on the trading positions of clearing members with dual membership, in order to monitor any overall risk position that could disrupt the smooth default management process.[20] One other possible solution would be to find a way to prevent the inter-CCP exposure from becoming too large to manage, e.g. by setting position limits. If these limits were in danger of being breached, the CCPs could prevent the clearing of further trades for their respective clearing members unless they offset outstanding trades or involved "domestic" clearing members only. It seems likely that in the event of default of an interoperable CCP, the surviving CCP might "tear up" the contracts with its clearing members and terminate the clearing service, instead of continuing to guarantee a risky portfolio. Furthermore, in the context of the default management process, the use of recovery and resolution tools other than auctions, which are further described in subsection 5.2, should be considered.

4.2.3 Coping with a CCP default via a link

The default management process is challenging in the case of an interoperable CCP clearing derivatives with a significant cross-CCP position. As described by Lewis and McPartland (2016), inter-CCP exposures may become very significant in a derivatives interoperability arrangement and, as a result, it is possible for both interoperable CCPs to be the largest clearing member vis-à-vis the other. As described in Section 4.2.2, while a CCP clearing securities will have to buy or sell securities that were due to be settled on that day in any case, and to close out positions over the following days, a derivatives CCP must auction the entire book of positions that have accumulated over months (or years) over the period of a few days. Because market liquidity may be lower for OTC derivatives clearing, an inter-CCP exposure that is larger than that of any clearing member is of particular concern. This is compounded by the fact that, unlike clearing members, interoperating CCPs cannot, in principle, lower the size of their exposures to one another, except by raising position limits for their clearing members. This implies that in a

[20] For the danger of splitting large directional trading positions at various CCPs see Samuelson, Charles, A. (1996), The Fall of Barings: Lessons for Legal Oversight of Derivatives Transactions in the United States.

CCP default scenario, clearing members must be willing to take up large long-term exposures from a defaulting CCP. This is particularly problematic for OTC derivatives, given that their maturities are longer and that clearing members will need to find another willing counterparty if they want to hedge or close out a position taken up from the defaulting CCP.

A CCP default typically occurs when the financial system is already under stress arising from the default of other financial entities. CCPs are designed to be highly resilient infrastructures that are tightly regulated and supervised and must be able to withstand the default of their two largest clearing members during adverse market conditions. Reflecting this, a CCP default – unless triggered by a non-default event – typically occurs when the financial system is already under significant stress from the default of other financial entities, such as large banks. Such a crisis is likely to trigger at least a number of other credit events. Therefore, not only would an interoperable CCP have to cope with the default of the other CCP, it would also need to manage the fulfilment of the triggered credit derivatives at the same time, if it clears credit default swaps.

4.3 Possible financial stability benefits from interoperability arrangements for derivatives

Interoperability arrangements link different CCPs with each other, thereby providing multilateral netting possibilities. In addition, for exchange-traded products, they allow a small market to access a larger pool of liquidity, often in another jurisdiction (or another Member State in the case of the EU). As outlined in Section 2, this connection could act as a potential channel of contagion. However, as also pointed out in BIS (2017) and ESMA (2018), since the central clearing landscape at global level and in Europe is already highly interconnected via common clearing members and service providers such as custodians, indirect channels of contagion already exist.

The available literature on interoperability arrangements, although scarce, confirms that CCP links have two opposing effects on exposure. On the one hand, inter-CCP netting produces a benefit while, on the other, inter-CCP exposure results in a cost. A number of authors have demonstrated that, depending on the assumptions made with regard to parameters, participation and the distribution of obligations, the netting benefit may dominate and that CCP links can, therefore, decrease aggregate exposure. To the extent that collateral requirements reflect underlying exposures, this implies that CCP links can economise on collateral (Cox et al., 2013). Singh (2013) argues that it is not certain that interoperability or similar link arrangements would reduce aggregate counterparty exposure. For the same reason, it is also unclear whether linking CCPs would increase or lower the collateral requirements associated with participating in centrally cleared markets. From a system-wide perspective, it can therefore be assumed that establishing an interoperability CCP arrangement has the potential to reduce overall exposure and, hence, demand for collateral. Conclusions can, however, only be drawn based on the evaluation of a case-by-case analysis, depending on the actual features of the (to be established) link.

According to ESRB (2016), the main financial stability benefit of interoperability is that netting efficiency may, to some extent, be achieved for a single, global CCP. The report also highlights the fact that this increase in netting efficiency reduces aggregate exposure in the system, which limits the potential for contagion if one or more participants default. Another benefit noted by the report is that multilateral netting also reduces the number and value of deliveries (for individual

financial instruments) and payments that are required to settle a given set of trades, reducing liquidity risks and transaction costs.

Finally, one potential benefit of a CCP link is that it could provide the alternative clearing solution of access to a CCP when its clearing members are not willing to onboard new clients. As global and EU analyses show, the client clearing business is highly concentrated and, in some circumstances, a CCP's clearing members may not be inclined to expand the number of intermediaries they clear for. Providing alternative ways to access a CCP indirectly (for instance through an interoperable CCP, on condition that members become a clearing member of that CCP) could be a possibility. However, such an approach would not be beneficial under all circumstances, since there should be no overlap, or only limited overlap, of the clearing membership in both CCPs. The clearing members in the interoperable CCP should also be inclined to provide client clearing business.

In conclusion, it appears that, in line with the findings in ESRB (2016), interoperability arrangements can bring both benefits and risks in terms of financial stability. This also holds true for interoperability arrangements for derivatives. However, in comparison with CCP links for securities, additional safeguards are needed to ensure that the system-wide benefits outweigh the systemic costs and risks. While some of the risks described could be addressed by the forthcoming framework on recovery and resolution of CCPs, a review of the EU regulatory framework for CCPs could clarify the conditions for the establishment of interoperability arrangements for (OTC) derivatives. This would not only provide legal clarity, but would also facilitate an improvement in the existing safeguards relating to the risk management of interoperability arrangements for derivatives.

4.4 Obstacles to the development of interoperability arrangements for derivatives

Currently, there is no information with regard to new initiatives for setting up interoperability arrangements for derivatives.[21] This is acknowledged in European Post Trade Forum (2017) which states that "[i]nteroperability in the derivatives space is currently not a prevalent feature of the post-trade landscape." There may be several explanations for this apparent lack of market appetite, even though some market participants argue that interoperable CCPs should be part of the construction of the EU Capital Markets Union.[22]

One factor could be the lack of a clear business case from the perspective of CCPs and their participants. While the benefits of interoperability arrangements for derivatives appear to be limited from a financial stability perspective, they also seem to be limited from a pure business perspective for CCPs, their clearing members and their clients. This could be due to a perception that the risks and costs involved are too high.[23]

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21 In addition to the existing link between SIXX NO and LCH Ltd for exchange-traded equity derivatives.

22 AFME, A Roadmap for Integrated, Safe and Efficient Post Trade Services in Europe, May 2018.

23 In this sense, see Duffie and Zhu, 2011, "The interoperability of CCPs, by which at least some of the benefits of joint clearing can be obtained through agreements among CCPs and their participants, can in principle achieve significant reductions in counterparty risk, although obtaining effective interoperability agreements currently presents a number of legal and financial engineering challenges."

Another factor could be the missing driver in the case of interoperability arrangements for financial instruments that are only traded bilaterally. Historically, interoperability arrangements have been established when two or more CCPs clear the same financial instruments, which are already traded on a trading platform (e.g. equities) – in other words, when a second CCP wants to clear for a trading venue that is already served by a first (incumbent) CCP. In essence, trading venues were the drivers or catalysts behind the establishment of interoperability arrangements in the past. From experience gained so far, it is not clear which party would act as the driver or the catalyst in implementing interoperability arrangements for products traded bilaterally, e.g. a non-listed bond or OTC derivatives. In addition, establishing interoperability arrangements for OTC derivatives could be seen as CCPs taking a step into uncharted waters, since so far there has been no example of such arrangements.

The incentives to establish interoperability arrangements differ according to the implications these arrangements have for different CCP stakeholders. Large broker-dealers, as the most active clearing members, may derive the most benefit from the increased number of multilateral netting opportunities provided by interoperability arrangements. This is because their market-making activities result in a large amount of transactions that often net out. Because of this, their net outstanding open positions may be rather small. On the other hand, it would assume that these clearing members do not currently benefit from near-maximum netting, which is debatable given the concentration of OTC derivatives clearing. Under an interoperability arrangement, clearing members could also concentrate on one CCP, thereby saving on the costs of accessing several CCPs. This holds under the assumption that interoperability arrangements would be an improvement on a situation in which there are more than a few smaller CCPs, which is not the case for (OTC) derivatives. However, clearing members of a CCP might not be interested in (or even opposed to) implementing arrangements which could decrease demand for their services. For example, clearing members might lose the business of offering smaller market participants access to several CCPs, should these participants be able to connect to one of the interoperable CCPs.[24] CCPs could be hesitant to make choices which could be seen as competing with their clearing members' domain. Nevertheless, smaller market participants, together with local market infrastructure providers, might have an interest in pushing towards the implementation of arrangements which could provide an alternative to the provision of clearing services by global or major broker-dealers.

As CCPs clearing ETDs are specialised, there is no benefit from establishing interoperability arrangements for these products. One main driver for setting up interoperability arrangements is that market participants wish to exploit the improved netting opportunities for the financial instruments they currently clear in different CCPs. However, in contrast to fungible equities, ETDs are not traded on different exchanges (e.g. Brent crude oil futures on ICE or milling wheat on Euronext Paris) and are only cleared at one CCP. Although some ETDs are economically identical they do not, however, have the same common identifier (ISIN), which may be one of the factors driving lower demand for ETD interoperability.

[24] For a similar qualitative cost-benefit analysis see "Access to Central Clearing Services for Over-the-Counter Derivatives", Slive, Wilkins and Witmer, Bank of Canada, 2011.

5 Interoperability arrangements during the recovery and resolution of CCPs

One major source of concern, as yet untested, are the risks emerging from the complex interactions between the recovery and resolution processes of interoperable CCPs. This section discusses these interactions by drawing on CCPs' rulebooks and bilateral link agreements, which describe CCPs' provisions for addressing the risks that emerge when an interoperating CCP defaults. In addition, the section summarises the relevant provisions in the draft legislative framework on recovery and resolution for CCPs in interoperability arrangements. It also discusses the impact of interoperability arrangements on the portability of clearing members' contracts with other CCPs. However, the present limitations of the regulatory framework should also be taken into consideration, as there still is no common EU framework for the recovery and resolution of CCPs.[25]

The proposed legislative framework envisages three distinct scenarios. First, a business-as-usual phase is considered during which CCPs handle the default of a member through the default management process codified in their rule books while resources remain, at all times, above the EMIR minimum requirements. Second, a recovery phase takes place if the losses cannot be resolved by the CCP's normal default management process or extraordinary tools and actions are required to replenish them. Third, a resolution phase, managed by a specially appointed resolution authority with additional tools and powers, aims at the preservation of financial stability by maintaining the CCP's critical functions, while trying to minimise the use of taxpayers' money. Although only a limited number of the draft provisions in each of these phases refer specifically to interoperability arrangements, the general principles applicable to the different phases have material repercussions on the performance of CCP interoperability arrangements under these different scenarios.

The existing provisions in the default procedures for the interoperable CCPs may have to be amended once the CCP recovery and resolution legislative framework becomes law. In addition, the limitations or obligations imposed on one CCP by the implementation of recovery or resolution tools by the other CCP should be incorporated into the existing provisions governing interoperability arrangements in the CCP rule books. The overall objective of the following analysis is to identify criticalities and areas of concern from a macroprudential perspective, based on the draft legislative text (which might be subject to changes).

5.1 The treatment of inter-CCP exposures in the event of a CCP default

The rights and obligations of CCPs in interoperability arrangements are governed by bilateral agreements between the participating CCPs. These include master clearing link agreements and the CCP rulebooks. This section sets out the actual provisions of linked CCPs to

[25] The **European Commission's legislative text**, subsequently amended by the **Presidency of the European Council**, is still a work in progress, and will eventually need to incorporate the European Parliament's views. This report is based on the latest publicly available drafts at the time of writing, namely the 19 December 2017 Council text and the 31 January 2018 report by the **European Parliament**.

address the risk of an interoperating CCP going into default. In accordance with the ESMA Guidelines (ESMA, 2013), each CCP is required to apply at least the same daily risk management methodology to its inter-CCP exposures as it does to its clearing members. Pursuant to these guidelines, CCPs in an interoperability arrangement may not contribute to each other's default funds to prevent stress contagion passing from one linked CCP to the other. However, this does not mean that the members' mutualised default fund resources are accessed sooner than in the case of a member default. This is because CCPs charge each other an additional margin to address this tail risk, which is normally covered by default fund contributions.

The EMIR provisions stipulate that the collateral provided by a CCP to an interoperable CCP is only available following the default of the CCP which provided the collateral. In the event of the default of the CCP which has received collateral in the context of an interoperability arrangement, the collateral must be readily returned to the providing (non-defaulting) CCP. The provisions to return collateral posted as initial margin to non-defaulters also apply to all other clearing members, thus making the loss of the initial margin provided as unlikely as possible. The main difference between regular clearing members and interoperating CCPs is that CCPs are not permitted to contribute to each other's default funds. CCPs usually resolve this lack of pre-paid resources by increasing, accordingly, the initial margin requirements for interoperable CCPs, compared with those for an ordinary clearing member.

An analysis of the existing provisions for the respective interoperable CCPs in the EU/EEA suggests that they are, in fact, treated similarly to their clearing members. The CCPs calculate margin requirements for transactions cleared via the interoperability arrangement using the same method they use for their clearing members. Although they do not collect a default fund contribution, CCPs call for additional collateral (provided by all clearing members using the clearing service featuring interoperability, and not just those members using the link)[26] to cover potential losses resulting from the default of a linked CCP, equal to a default fund contribution. Table A.1 in the Annex gives a more detailed overview of this provision in CCP rulebooks.

However, this system for pre-paid contributions from CCPs participating in interoperability arrangements is not risk neutral. On the one hand, because the interoperable CCP does not contribute to the default fund of the other CCP, its pre-paid resources will not be mutualised in the event of the default of a member of the collecting CCP. On the other hand, the excess collateral posted by the interoperable CCP, although funded by its members, does not offer the same protections as normal initial margin collateral. Specifically, the additional collateral funded by members and posted to the other CCP for the interoperability arrangement would be appropriated in the event of the default of the posting CCP, and would therefore not be returned to the non-defaulting members of the defaulting CCP who posted it (whereas the initial margin posted by non-defaulting members would be protected). The net effect is that there is limited mutualisation among the members of each CCP, there is no cross-mutualisation of losses and interoperable margins

[26] ESMA (2015) provides some further information on the provision on the additional margin for interoperability links: "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 […] 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."

behave like junior tranches of the default fund contribution. In trying to assess the suitability and risks of interoperable arrangements it is important to note the environment in which a CCP default is likely to be different from the default of a "normal" clearing member, and may be accompanied by increased market volatility. The default arrangements specific to each CCP interoperability arrangement are set out in more detail in Table A.2 in the Annex.

In the event of the default of an interoperable CCP, all CCPs under consideration have arrangements in place and would manage the default similarly to how they would manage a defaulting clearing member. As summarised in Table A.2 in the Annex, one aspect is that the collateral pledged by the defaulting CCP and financed by its clearing members would be used first (before the CCPs' skin-in-the-game and the clearing members' contributions to the default funds of the surviving CCP) and any new transactions with the defaulting CCP would no longer be accepted and novated. Whereas each CCP may assume the default of clearing members to be largely uncorrelated, a default of an interoperable CCP would most probably be due to the default of at least three[27] of its largest clearing members, an unexpected combination of default and non-default losses, or an extreme non-default related loss. The default of a CCP is therefore less likely than the default of a clearing member, although it may be assumed that it would be more severe. Furthermore, there are a number of tools that can be applied to clearing members in the context of default management, i.e. recovery, and especially resolution. These cannot be legally applied to another CCP, given the differing legal natures of CCPs and clearing members.

5.2 Regulatory provisions on the treatment of interoperability arrangements during the recovery and resolution of CCPs

The European legislative proposal for a framework for the recovery and resolution of CCPs defines interoperability arrangements as those established under Title V of EMIR.[28] This would exclude any arrangement which is not covered under that title, such as (OTC) derivatives. Furthermore, interoperability arrangements are not specifically addressed and are, in fact, only mentioned on a few occasions, as listed below:

- Article 4(2) and (4) – Resolution colleges. Competent authorities and resolution authorities of the EU CCPs with which the CCP has established an interoperability arrangement will participate in the resolution colleges. In addition, competent authorities and resolution authorities of third-country CCPs with which the CCP has established an interoperability arrangement may be invited to participate in the resolution college as observers.

- Article 7(f) and (h) – General principles regarding decision-making (referring to resolution authorities and colleges). Due consideration must be given to linked financial market infrastructures, including interoperable CCPs, and to the relevant effect of the proposed

[27] According to EMIR, the default fund should at least enable the CCP to withstand, under extreme but plausible market conditions, the default of the clearing member to which it has the largest exposures or that of the second and third-largest clearing members, if the sum of their exposures is greater.

[28] Article 2(16): "interoperable CCP" means a CCP with which an interoperability arrangement has been set up under Title V of Regulation (EU) No 648/2012.

decisions and actions on interoperable CCPs, before such decisions or actions have been taken. This includes taking financial stability into consideration.

- Article 13 – Resolution plans. The resolution plan for a CCP should include a "description of critical interdependencies between the CCP and other market participants and interoperability arrangements and links with other financial market infrastructures".
- Article 15 – Coordination procedure for resolution plans. Third-country authorities might be involved in the review of the resolution plan if a CCP in their jurisdiction is interoperable with an EU CCP.
- Article 17 – Addressing or removing impediments to resolvability. CCP interoperability arrangements may be restricted or prohibited if it is necessary to avoid any adverse impact that the use of the resolution tools and the exercise of the resolution powers could have on interoperability of CCPs.

The provisions in the draft legislative text refer mainly to the organisation of resolution colleges and resolution plans. However, they do not include provisions covering the specific treatment of interoperability arrangements in the recovery and resolution of CCPs. It is therefore not clear how the tools included in the current legislative proposal would be applied to interoperable CCPs. The ESRB would like this regulatory gap to be closed. In the absence of legal clarity a preliminary analysis of the implications of the current provisional text is presented below.

Notwithstanding the requirements set out in Article 7, there is no special status for interoperable CCPs in the draft legislative framework for the recovery and resolution of CCPs. In the framework, CCPs are conceptually treated as if they are just another regular clearing member, with the notable exception that they do not contribute to each other's default funds. This has a number of consequences. According to the legislative proposal, when drawing up recovery and resolution plans and making decisions, CCPs and authorities must take into account the CCPs' interconnectedness with other financial market infrastructures. This ignores, however, the fact that an interoperability arrangement is a complicating factor in itself that could also have an impact on the effectiveness of other tools foreseen for a CCP's recovery and resolution. Therefore, the impact and feasibility of certain tools such as forced allocation, termination of contracts, or sale of business in relation to existing interoperability arrangements could be included in the recovery and resolution plans of CCPs.

Another area of uncertainty is the performance of specific recovery and resolution tools. On the one hand, the existence of interoperable CCPs has an impact on the tools used. On the other hand the toolkit, as suggested in the legislative proposal, may not be suitable for CCPs involved in interoperability arrangements. For example, variation margin gains haircutting (VMGH) allows a recovering CCP to reduce the positive variation margin payments to members to cover losses, e.g. following the default of a clearing member. This is a tool that can only be used in a controlled environment, i.e. in the context of a recovery plan. If the tool is applied to an interoperable CCP, it is unclear whether and how the losses caused by the VMGH could be applied to inter-CCP positions in interoperability arrangements. Currently, some CCPs have provisions in their rule books which exclude the interoperable CCP from the application of recovery tools. This also applies to additional recovery and resolution cash calls, rebalancing tools like partial or full tear-ups, and the conversion of unsecured liabilities into instruments of ownership. The problem with these

provisions is that they are designed so that the default management procedures of CCPs can be applied to their clearing members. Using these instruments between a CCP and an interoperable CCP and, therefore, treating a CCP as just another clearing member, may have unintended consequences. Whereas the recovering CCP has special powers stipulated in its rulebook which allow it to pass losses on to members, the non-defaulting interoperable CCP – which is hit by these losses – would need to anticipate such situations in its rulebook for it to have the same powers which allow it to pass losses on to its members. This is particularly clear in the case of VMGH. However, as long as the non-defaulting interoperable CCP is not itself in a state of recovery, it may lack the legal grounds for using recovery tools. A shortfall may even qualify as a default for the interoperable CCP, thereby triggering default management procedures. Hence, triggering recovery tools across interoperability arrangements could lead to significant contagion effects.

Treating a CCP as a regular clearing member underestimates the probability that multiple clearing member defaults could be the underlying reason for the default of an interoperable CCP. As explained in Section 5.1, if CCPs have common clearing members, the default of an interoperable CCP could be caused by several simultaneous clearing member defaults. Furthermore, the feasibility and reliability of additional margin calls to a restricted pool of surviving clearing members is brought into question because the clearing members would have to manage simultaneous multiple CCP default management procedures and various recovery or resolution tools, all at the same time. Notwithstanding the technicalities, the overall assessment is that the regulatory framework for CCP recovery and resolution currently under discussion may lead to increased systemic risk and high uncertainty when applied to interoperable links. There is also a high risk of legal challenges which could slow down, or even impair, the execution of the proposed plans.

The legislative proposal should consider the effect of recovery and resolution measures on financial stability. It is important to avoid endangering one or more other CCPs, and possibly their clearing members, by trying to save a CCP. The outcome of the loss allocation measures is related to this. According to the latest Presidency compromise text for the legislative proposal on a recovery and resolution regime for CCPs, default losses should be borne by clearing participants, which include clearing members, clients and indirect clients.[29] The draft legislative framework is unclear on whether an interoperable CCP can be treated as a clearing member. If that were the case, the clearing members of an interoperable CCP could be treated as the clients of the CCP clearing member, and any additional call from the recovering CCP would either have to be paid from the capital of the interoperable CCP, or it could be passed on to the CCP's clients and clearing members. However, this might open a channel of contagion between CCPs and lead to a greater material risk of a non-default event. CCPs operate on the assumption that they can call on resources from their members, although this does not work the other way around. This principle could, however, be invalidated if recovery and resolution powers were enforceable. Preferably, interoperable CCPs would have enforceable contractual agreements with their clearing members which would allow them to use recovery-like tools, even outside their own recovery. If this were not the case, they would be forced either to increase their own capital to withstand any extraordinary cash calls or to terminate all contracts with the interoperable CCP as soon as there was any

[29] Article 2, paragraph 1 of the **Presidency compromise** of the legislative proposal on a CCP recovery and resolution framework.

indication of deteriorating conditions. The latter is rather unsettling from a systemic stability perspective.

In conclusion, there are challenges facing the legislative proposal on a CCP recovery and resolution regime for the treatment of interoperable CCPs. One aim of the regulatory provisions for CCP interoperability arrangements is to reduce contagion risk between the two linked CCPs, which is why they are not allowed to contribute to each other's default funds. Other powers to return to a matched book, such as a partial tear-up, a forced allocation, or the use of loss allocation tools such as VMGH, could be restricted to the clearing participants of the affected CCP in order to avoid contagion across the link, which is currently common practice. However, a legislative proposal on CCP recovery and resolution will have to take the potential negative results of such an approach into consideration. These could include an unbalanced distribution of the burden impacting the clearing participants of the recovering CCP, and could have a negative impact on the likelihood of that CCP's recovery being successful. With regard to possible interoperability arrangements for derivatives, these potential problems may occur to a lesser extent for ETDs, as these are traded in an order book with a transparent central limit, on a trading venue to which CCPs could resort in order to return to a matched book. The default management process for ETDs normally envisages a CCP becoming an active trading participant at the trading venue and concluding opposite trades (e.g. selling a future or buying a put option) to close out the portfolio of a defaulting clearing member or CCP. However, in the hypothetical case of an interoperability arrangement for OTC derivatives, it is likely that a surviving CCP would opt for partial or full tear-up and that, therefore, the clearing of these products would be discontinued, running counter to the original purpose of central clearing. If interoperable CCPs were treated in a recovery or resolution as regular clearing members, this would produce unforeseen risks for the CCP's own risk management, its clearing members and financial stability, and would create legal uncertainty. In conclusion, addressing the special nature of interoperability arrangements in the legislation is necessary to avoid any unintended consequences deriving from the application of CCPs' recovery tools and resolution plans.

5.3 The impact of interoperability arrangements on the portability of clearing members' contracts with other CCPs

Porting rules refer to the transfer of clients' positions from a clearing member that has defaulted to another clearing member of the same CCP. The legal provisions make no reference to the porting of clearing members' contracts to linked CCPs in the event of a CCP's default. For example, Article 48(5) EMIR on default porting procedures refers to a "defaulted clearing member's clients". Likewise, the PFMI refer to the default and insolvency of a "participant".

Porting clearing members' contracts from one CCP to another is different from porting clients' positions. The former is designed not primarily to protect clients, but instead to preserve the continuity of critical clearing services. ESRB (2016) notes that interoperability arrangements between CCPs "could increase the likelihood of a defaulting CCP being quickly replaced by another CCP". This statement needs to be developed further. For positions to be ported it is necessary, at the time of the default, for the clearing members of the defaulting CCP to (i) already be clearing members at the interoperable CCP (ii) become clearing members at the interoperable CCP immediately or (iii) become clients of the clearing members of the interoperable CCP immediately.

If ad hoc procedures were not adopted or were not available, situation (i) would stand in contrast to the original demand for the establishment of an interoperability arrangement, as one driving factor would be that participants would aim to consolidate their open positions at one CCP and would no longer need to uphold multiple clearing memberships. Even if a second clearing membership were not used for clearing positions on a daily basis, the membership would still be costly because CCPs require regular minimum fees and minimum default fund contributions. This would be further exacerbated by participation in fire drills and other operational tests. Situations (ii) and (iii) would be very time-consuming in the absence of any pre-existing arrangements and would not, therefore, be feasible in a crisis situation.

There are practical reasons why porting members' positions from a defaulted CCP to the surviving linked CCP is not possible or, at least, is not possible over a short period of time. First, the onboarding of new members is a lengthy process and there are several related criteria and costs (e.g. an application fee, application documentation, banking arrangements, a due diligence visit, risk committee approval, and training the member's staff). This lengthy process conflicts with the very short porting period of up to 24 hours. Second, the members whose positions are ported must collateralise their positions at the new CCP, although it is possible that their collateral may be obstructed and used at a recovery and resolution stage in the insolvency of the old CCP. Third, for transactions involving securities, the settlement instructions between a member and its old CCP must be cancelled and replaced by new instructions between the member and its new CCP. Although not impossible, it would be operationally challenging to achieve this by a settlement deadline of two business days.

On the basis of standard procedures and membership arrangements, it is unlikely that interoperability arrangements could be a benefit to the portability of clearing members' contracts. However, it cannot be excluded a priori that ad hoc dormient forms of membership could be considered and agreed between the interoperable CCPs, with a view to allowing at least the most significant positions to be ported. This could also be a regulatory condition for an interoperability arrangement to be approved or even maintained. In this respect it is worth noting that ESMA (2013) specifies that CCPs should consider the "degree to which the portability of positions from a defaulting CCP to a non-defaulting CCP […] would contribute to the lowering of the inter-CCP exposures."

Finally, the portability and complete substitution of a failing CCP would only be possible if the two interoperable CCPs cleared the same asset classes and financial products. In most interoperability arrangements only a portion of the products cleared by each CCP is also cleared via the link. Therefore, on the basis of the current interoperability arrangements it is possible for only a portion (or some services) of a defaulting CCP to be ported to another CCP.[30] It is more likely that a CCP's default would result in the termination of the cleared contracts by the surviving CCP.

[30] If a CCP defaulted, its clearing members would not be able to port their cleared products (e.g. CDS) to the interoperable CCP because the latter does not clear CDS.

5.4 A macroprudential perspective on a recovery and resolution framework for CCPs in interoperability arrangements

One way of highlighting the complexities and risks of interoperability arrangements is to consider the desirable features of a suitable recovery and resolution framework. The following illustration is based on three assumptions: (1) all CCPs clear the same asset classes and there is a network of bilateral interoperability arrangements connecting multiple CCPs with each other; (2) at the outset, clearing members are only members of a single CCP and trades with members of other CCPs are cleared through interoperability arrangements between CCPs; (3) interoperable CCPs service the same trading venues.

At present, CCPs in interoperability arrangements do not participate in each other's default management processes. CCPs' current default management procedures do not involve linked CCPs, which may not contribute to each other's default funds. This means that in the event of the default of a clearing member, losses are mutualised only among the remaining clearing members of that CCP and its own capital, and are not passed on to the interoperable CCPs or their members through additional margin calls, auctions, forced allocations or contract tear-ups. Therefore, any loss passing from the interoperable link to its members cannot be passed on to the non-defaulting CCP.

One way to design a CCP recovery and resolution framework would be to ring-fence linked CCPs from any losses incurred by other CCPs. The objective of such a recovery and resolution framework – which would be similar to the status quo – would be to ensure that interoperability arrangements cannot become a channel for direct contagion and that any obligation between CCPs is always honoured. The framework would stipulate that neither the recovery nor the resolution plans can impose losses on the interoperable CCP and that all loss allocation tools would only be applied to the remaining clearing members (and perhaps also clients) of the CCP managing a default. Direct losses could only be mutualised between CCPs in the event that a CCP defaulted in a disorderly manner despite the recovery and resolution framework and, also, only if the additional margin that CCPs post to each other to collateralise the interoperability arrangement was insufficient to cover the loss.

A drawback of such a recovery and resolution framework would be that it could create incentives for clearing members to switch between CCPs in a procyclical manner. Ring-fencing an interoperable CCP from any losses incurred by the other CCP would imply that positions would be either subject to, or spared from, the mutualisation of losses arising from a defaulting clearing member, depending on which of the two CCPs they are cleared through. This could, in theory, create an incentive for firms to become clearing members of both CCPs and to attempt to transfer positions during stressed situations to whichever CCP is perceived as being the least risky, in order to avoid mutualisation. Although minimum default fund contributions and the monthly cycle of adaptions to the default fund would discourage such behaviour, they might not prevent it. Increased shared memberships would also increase the chances of the simultaneous multiple default of clearing members and would reduce the operational benefits of interoperability. In addition, the movement and re-booking of trades across the two CCPs could, in itself, be a source of instability, as members and clients would rush to reposition their outstanding balances. One side effect could be that, if the objective to reduce positions at the weaker CCP prevails over considerations of margin efficiency through netting, this rebalancing could be associated with a

significant increase in margins[31], which could have procyclical implications. In other words, what might at first seem to be an airtight solution for interoperable links in recovery and resolution, appears to have potentially unintended consequences.

Another way to design a CCP recovery and resolution framework would be to treat interoperable CCPs as separate in good health, but joint in recovery. The framework could introduce a provision stipulating that the tools and measures the recovery plan imposes on the clearing members of a CCP in recovery or resolution – such as forced allocations, tear-ups and VMGH – would apply to the clearing members of the other CCP as if that CCP was also in recovery. Such a framework would, de facto, treat the two CCPs as a single CCP for the asset class covered by the interoperability arrangement.

A drawback of such a recovery and resolution framework is that it would not prevent direct contagion between CCPs. Legal complexities aside, implementing this model would require a joint, integrated recovery and resolution plan across multiple CCPs – potentially cross-border and cross-asset classes. The practicalities of including the risk assessment of any interoperable CCP when considering membership of a CCP would also have to be considered and, therefore, the aim of preventing contagion between interoperable CCPs would be frustrated. A first precursory assessment would suggest that the de facto implied outcome of the approach would be to ban interoperability altogether, due to the operational and regulatory complexity of implementation.

A third way to design a recovery and resolution framework would be to follow the full-separation approach described above, with adjustments for shared members. These adjustments could be in the form of identifying – and treating differently – positions held by the same members across both CCPs and, therefore, potentially through the interoperable link. These adjusted positions could be subject to the provisions and tools of the recovery and resolution plans. The outcome would be very complex, carry significant legal challenges, and possibly result in punitive treatment which would ultimately disincentivise dual clearing membership, and would also make porting an operational impossibility. The close out of positions in this case would, necessarily, induce liquidity fragmentation at the shared venues, because the costs – and the price – for single-members would be different from that for dual-members. In all cases a specific consideration of interoperable links is required when drafting a recovery and resolution framework.

Each of the three approaches for treating interoperability arrangements in a recovery and resolution framework would require clarification from the co-legislators. Interoperability arrangements may be designed to perform in different ways under stress and these different designs have both benefits and drawbacks. Deciding on the best approach requires a careful assessment of the trade-offs. While this report does not indicate a preferred model, the analysis shows that none of the models could be implemented under the current EMIR framework without inconsistencies and the risk of legal uncertainty. Furthermore, the text of the proposed recovery and resolution legislative framework, as publicly available at the time of this report, does not seem to address these uncertainties as far as the design of the provisions and their applicability to interoperability arrangements are concerned.

[31] This is a scenario in which members shift from a strategy where they run closely offsetting positions, designed to minimise margin contributions, to a strategy where the objective is to reduce the exposure to a specific CCP. This second strategy can be achieved by moving exposures to follow the safe strategy, even if this implies less offset, and therefore higher margins.

Box 3
Analysis of cross-margining arrangements between CCPs

Cross margining is a specific example of portfolio margining. Portfolio margining is a risk management technique that allows clearing members to offset closely correlated financial products in a predefined portfolio segment in order to benefit from initial margin reductions. By contrast with interoperability arrangements, portfolio margining can be applied across products belonging to the same asset class, and also between different market segments, e.g. in the case of a short futures position and a long call option position that reference the same underlying financial instrument (ESRB, 2016).[32]

Portfolio margining can also be implemented across CCPs – in this case it is commonly referred to as "cross margining".[33] Clearing members with dual membership which participate in two CCPs operating a cross-margining link are allowed, under this arrangement, to net their exposures with offsetting risk characteristics across the two CCPs, for the purpose of calculating the margins owed to each CCP. CCPs must share information on participants' positions and work together to calculate the offsetting benefits applicable to initial margin requirements, and the daily net variation margin for the gains and losses of each cross-margined portfolio. If a member of a CCP participating in a cross-margining arrangement defaults, the offsetting positions across the two CCPs will probably result in gains for one CCP and losses for the other. For the cross-margining framework to be prudent, the two CCPs must, therefore, coordinate their default management procedures by sharing the resulting gains and losses on that participant's cross-margined positions and collateral. This ensures that any excess margin in one CCP is not returned to the liquidator of the defaulted joint clearing member before all losses have been covered at the other CCP.

While cross margining establishes a form of joint risk management between different CCPs, it differs from interoperability arrangements in significant ways. In particular, while interoperability arrangements seek to allow participants that are members of different CCPs to clear trades with each other (without requiring them to be a member of each CCP), cross margining seeks to allow participants that are members of multiple CCPs to offset their own exposures across these CCPs for the purpose of optimising the collateral posted.

Examples of cross-margining arrangements

In the United States, cross-margining arrangements are used more frequently than interoperability arrangements. Examples of cross-margining links are the arrangements between CME (US) and the Options Clearing Corporation (OCC), CME and the Fixed Income Clearing Corporation (FICC), and OCC and ICE US. Risk management for cross-margining links can take various forms. For example, the cross-margining arrangements between CME and the OCC use a single account structure, where initial margin is held centrally and the CCPs jointly hold a first lien (security interest) on the positions and collateral in the cross-margin account.[34] By contrast, the

[32] More information on portfolio margining is provided in the **ESMA opinion on portfolio margining requirements under Article 27 of Commission Delegated Regulation (EU) No 153/2013**.

[33] The terms "portfolio margining" and "cross margining" are sometimes used interchangeably.

[34] See: **CME Inc PFMI disclosure**.

cross-margining arrangement between CME and the FICC uses a dual account structure, whereby initial margins are held separately at the individual CCPs, with each CCP guaranteeing payment to the other in the event of a loss due to the liquidation of a CCP's participant.

There are no cross-margining arrangements in the EU and, according to ESMA, they are not possible under EMIR. An international cross-margining arrangement was set up for short-term interest rate contracts between CME Inc (US) and LCH Ltd (UK) in 2000 (Hasenpusch, 2009), although it was terminated in 2010 as it was deemed uneconomic. EMIR, which was adopted in 2012, neither explicitly covers nor prohibits CCP cross-margining. However, according to ESMA[35] this practice is not feasible under the EMIR provisions because each CCP is responsible for holding sufficient initial margin to cover the default of a participant and cannot rely on receiving a payment from another CCP in the event a loss is incurred.

Although a number of links have been established in the United States, they do not appear to be widely used by CCP members. For instance, only 2.4% of CME Inc's trades (by value) are subject to cross-margining arrangements with OCC and the percentage of the OCC trades covered by the arrangement with CME is 0.2%. However, the margin savings, compared with posting margins to each CCP separately, amount to 96.2%. 2.1% of CME Inc's trades (by value) are subject to its cross-margining arrangement with FICC and the percentage of the FICC trades covered by the arrangement is 21%. The margin savings amount to 100% for the CME-FICC cross-margin arrangement.[36]

Financial stability benefits

Most of the cross-margining links in operation today were established as a result of the 1987 stock market crash in the USA. Originally designed to mitigate the financial stability risks that emerged from the equity market crash, cross margining brings significant financial stability benefits in terms of margin efficiency. These benefits are achieved by concentrating netting at a global CCP for all financial products, as described by Duffie and Zhu (2011). Indeed, offsetting across correlated products that are also denominated in different currencies leads, obviously, to lower initial margin requirements and lower amounts during the variation margin exchange, which minimises collateral calls and liquidity needs. This can encourage intermediaries to hold less-directional portfolios, to the extent permitted by their business models.

Cross margining also provides transparency and coordination benefits to CCPs. CCPs constantly share information on the trading positions of each member with each other, thus gaining a better insight into the interconnectedness and the actual exposures of their trading and clearing members. This provides a better picture of the vulnerability of a member compared with a situation in which there is no cross margining or other form of information sharing (Glasserman et al., 2015). This could be particularly useful in stressed market situations and, in fact, the first ad hoc cross-margining link was set up during the crash of 1987, when CME and OCC realised that certain participants were facing large variation margin calls in one CCP, despite having balanced portfolios across both CCPs. As a result, they cooperated with the authorities to allow those members to offset their exposures and pay only net margins (Norman, 2011). Furthermore, cross margining

[35] See: **ESMA** – Questions and answers on the implementation of Regulation (EU) No 648/2012 on OTC derivatives, central counterparties and trade repositories (EMIR).

[36] Source: CPMI-IOSCO Public Quantitative Disclosure Frameworks, Q1 2017.

requires both CCPs to harmonise and coordinate their risk management processes. This is particularly relevant for default management processes during which both CCPs close out a common participant's positions and liquidate the collateral simultaneously, and therefore need to achieve a degree of operational coordination.

Improved cross-CCP coordination and transparency stemming from cross-margining practices could have positive implications in a European context. This coordination and information exchange is preferable from a macroprudential point of view to the current situation in Europe in which CCPs can manage a clearing member default synchronously without any coordination or information exchange and, therefore, run the risk of triggering a fire sale spiral. In this regard, the joint fire drills of several large CCPs[37] are already a step in the right direction. However, EMIR does not, so far, require any information exchange or coordination in the event of a default. Finally, cross margining leads to clearing members holding portfolios which are more balanced, which makes them less costly to hedge or liquidate during the default of a clearing member.

Financial stability risks

Cross-margining arrangements can also generate risks to financial stability. These could occur in the event of a participant or CCP default. As mentioned above, in the event of the default of a cross-margin participant, the two CCPs share the gains and losses on that participant's cross-margined positions and the participant's collateral. This creates exposure between the CCPs because each CCP faces the risk of the other CCP defaulting at the same time as a cross-margined participant. However, the CCPs do not exchange collateral to cover this CCP's default risk as they would do in an interoperability arrangement. In this situation, if the surviving CCP suffers losses on the cross-margined positions, it could potentially have insufficient collateral to cover those losses (ESRB, 2016). In the event of a link between two CCPs operating from different jurisdictions, the shared collateral may not be available cross-border, which could jeopardise the management of a participant default (or the default of one of the CCPs themselves).

An additional risk is the potential breakdown of the correlations between the products that are being jointly margined through the link. Cross margining therefore needs to be based on highly reliable correlations, including in stressed market conditions. In this sense, however, the risks generated by inter-CCPs' cross-margining arrangements seem similar to the risks generated by portfolio margining practices "internal" to single CCPs.

[37] See Annual peer review of EU CCP supervision – Supervisory activities on CCPs' Default Management Procedures (2017), ESMA, December.

6 Conclusions and policy considerations

In Europe, interoperability arrangements exist for a small number of assets and are used mainly for the clearing of securities transactions. To date, there have been no interoperability arrangements for OTC derivatives and there is only one link for ETDs. This report shows that no new interoperability arrangements have been established between CCPs in the EU/EEA financial markets since the previous analysis conducted by the ESRB in 2016 (ESRB, 2016). Even though there is no public information with regard to new plans to set up interoperability arrangements, the clearing landscape in Europe could change in the future, for example owing to the extension of clearing services to additional asset classes or the emergence of new client clearing models. In addition, there is a high number of CCPs in Europe compared with the United States and there is some overlap in terms of asset classes cleared, including OTC derivatives subject to a clearing obligation. This could provide economic incentives for CCPs to establish further interoperability arrangements. As part of its macroprudential surveillance, the ESRB will continue to monitor the development of interoperability arrangements in Europe and their benefits and risks from a financial stability perspective.

The ESRB sees a need to clarify the treatment of interoperability arrangements in the upcoming CCP recovery and resolution framework. Since the publication of the ESRB's Report to the European Commission on the Systemic Risk Implications of CCP Interoperability Arrangements (2016), a draft proposal for a regulatory framework for the recovery and resolution of CCPs has been under consideration by the co-legislators. The proposal does not include specific provisions for the treatment of interoperability arrangements in the recovery and resolution of CCPs and does not cover (OTC) derivatives links. To reduce legal uncertainty and the potential for contagion between CCPs, the final legislative framework should clarify how recovery and resolution tools would be applied to interoperable CCPs, including recognised third-country CCPs. In addition, the ESRB would like to draw the attention of CCPs with interoperability arrangements and the authorities to the importance of taking into account the implications of such links when preparing recovery and resolution plans. Ad hoc provisions in such plans could help to mitigate the effects of, or even prevent, contagion.

In addition, the ESRB suggests clarifying in EMIR whether interoperability arrangements for derivatives could be approved and implemented and, if so, for which product types and under what conditions. ESRB (2016) has noted that interoperability arrangements, including those for derivatives, can bring benefits but can also pose risks to financial stability. This includes netting benefits, the reduction of outstanding gross exposures and better market integration, but also systemic risks arising from operational complexity, concentration risks, the danger of complete market closures, as well as the need for adequate cross-CCP margins and additional concentration margins for directional CCP link exposures. This report confirms this finding and shows that interoperability arrangements for derivatives, including OTC derivatives, require greater scrutiny than securities links to ensure that the system-wide benefits outweigh the systemic risks. The ESRB (2016) has already noted that EMIR only includes provisions for the risk management and establishment of interoperability arrangements for transferable securities and money market instruments, while it is silent on CCP interoperability arrangements for ETDs and OTC derivatives. However, according to ESMA, this does not mean that interoperability arrangements for derivatives have been banned (ESMA, 2015). The question of which product types and under what conditions

interoperability arrangements for derivatives can be implemented has not been addressed in the context of the EMIR REFIT.

In the ESRB's view it is important to remove the legal uncertainty surrounding derivative links. EMIR should clearly set out whether and, if so, for which product types and under what conditions, interoperability arrangements for derivatives can be approved and established. Such conditions need to be stricter than those already in place for transferable securities and money market instruments. For instance, CCPs could be allowed to actively manage the inter-CCP exposure, applying position limits or add-on concentration margins. Moreover, CCPs could be allowed to gather information on the comprehensive exposures of the clearing members acting on (OTC) derivatives cleared through an interoperability arrangement. From a system-wide perspective, an analysis of the expected combined effect on gross exposures would be useful for authorities considering whether or not to approve a link.

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Annex

Table A.1

Overview of CCP provisions for interoperable CCPs

	LCH SA – CC&G	LCH Ltd – Six x-clear[38] and LCH Ltd – EuroCCP	Six x-clear – EuroCCP
Margin requirements	Margin requirements are similar to those for clearing members but exclude intraday margins.	Margins calls by both interoperating CCPs on a daily basis – requirements similar to those for clearing members. LCH Ltd collects the additional collateral required by applying a risk multiplier to each member's end-of-day initial margin requirement within the clearing service for which interoperable links exist.	Margin calls by interoperating CCPs on a daily basis.
Financial resources in place to cover inter-CCP risks	Exchange of a specific additional margin that is deposited in cash on central bank accounts and used only in the event of the default of the linked CCP.	Additional collateral held in pledge arrangements at an international central securities depository.	Additional financial resources to cover inter-CCP risk.
Procedures in the event of a CCP default	Management of defaulting CCP's open balance contract positions in accordance with CCP default rules, i.e. similar to the process for defaulting clearing members. Closing out of outstanding open positions. Use of defaulting CCP's dedicated initial margin and additional collateral from clearing members to cover related losses from the inter-CCP exposures.	Management of defaulting CCP's open balance contract positions in accordance with CCP default rules, i.e. similar to the process for defaulting clearing members. Use of defaulting CCP's dedicated initial margin and additional collateral to cover related losses from the inter-CCP exposures.[39]	Management of defaulting CCP's open balance contract positions in accordance with CCP default rules, i.e. similar to the process for defaulting clearing members. Use of defaulting CCP's initial margin and additional collateral to cover losses.

Source: CCP Rulebooks and Master agreements of the specific links: ***LCH SA – CC&G*** *and* ***CC&G-LCH SA,.LCH Ltd – Six x-clear*** *and* ***Six x-clear – LCH Ltd, LCH Ltd – EuroCCP, Six x-clear - EuroCCP***

[38] With Six x-clear, LCH Ltd has two separate links: one with the Swiss clearing house (for cash equities) and another with its Norwegian branch (for cash equities and equity derivatives).

[39] The surviving CCP's default fund is also available to cover losses.

Table A.2

Default arrangements specific to each interoperable link (presented with examples of selected CCPs)

Link	Default arrangements
LCH Ltd and Six-x-Clear/EuroCCP	LCH Ltd's default arrangements: In the event of the default of the interoperating CCP (e.g. in the event of insolvency), LCH Ltd would manage the defaulting CCP's open balance contract positions in accordance with its own default rules. Moreover, LCH Ltd can suspend its obligation to continue clearing new trades with the interoperating CCP, in a defined range of emergency situations. LCH Ltd's recovery arrangements are designed to ensure that LCH Ltd itself does not default or enter insolvency as a result of default losses, e.g. in the case of a defaulting interoperable CCP. For EquityClear, these are: 1. a power of assessment / cash call on clearing members to replenish the default fund (up to the value of the clearing members' initial contribution to the default fund), followed by; 2. a daily loss allocation process representing a capped amount of cash calls on clearing members, followed by; 3. service closure through the full tear-up of EquityClear products, with termination payment between the CCP and clearing members due once positions have been terminated. LCH Ltd may haircut its obligation to pay out on termination payments, as a way of extinguishing any outstanding default losses. Under LCH Ltd's rules, interoperating CCPs are carved out of the first two steps of these recovery loss allocation arrangements, and LCH Ltd will prioritise the payment of termination amounts to interoperating CCPs.
Six-x-clear/EuroCCP	Six-x-clear's default handling procedure: In the event of the default of Six-x-clear: for the interoperating CCP, the inter-CCP collateral as pledged to the interoperating CCP and financed by the clearing members, as well as the x-clear capital and reserves (as available), are in place to absorb potential losses. In the event of the default of an interoperating CCP (e.g. if it does not comply with its obligation to provide collateral) the open offer and/or novation process will immediately be suspended for this interoperating CCP. EuroCCP default handling procedure: If an interoperating CCP is the defaulting party, EuroCCP will first enforce the collateral provided by the interoperating CCP. If the proceeds of this security are insufficient to cover the losses suffered by EuroCCP, EuroCCP will then apply €3 million from its own funds before applying the clearing fund. EuroCCP will suffer a loss if: * the interoperating CCP defaults on its obligations to EuroCCP after exhausting all its available financial resources; * collateral from the interoperating CCP is insufficient to cover EuroCCP's losses after the closing of the interoperating CCP's obligations to EuroCCP; The loss to EuroCCP in excess of the collateral from the interoperating CCP will be covered by other financial resources available to EuroCCP, such as equity and loss sharing from surviving clearing participants.

LCH SA/CCG	LCH SA's default arrangements: In the event of the default of the interoperating CCP (CC&G) clearing members active in the respective transactions will be promptly notified and any further fixed income transactions in Italian government securities will no longer be accepted and novated. LCH SA might also take any type of measures in coordination with the respective competent authority to contain its exposures and to mitigate overall market effects, whether or not these measures are set out in the Clearing Rules. Furthermore, LCH SA states that they might take any of the following measures or any other measures at its sole discretion: * sell any securities delivered by clearing members to LCH Clearnet SA in connection with the cleared transaction via the link; * cancel any settlement instructions with regard to fixed income transactions in Italian government bonds which have not yet been settled, and stop issuing any new instructions. LCH SA's arrangements for managing a default of CC&G envisage that LCH SA would immediately terminate and cash settle all interoperable positions (i.e. the LCH SA – CC&G leg and the LCH SA and LCH SA CM leg) on the default of CC&G. The provisions of CC&G mirror the LCH SA arrangements.

*Sources: CCP Rulebooks and Master agreements of the specific links; **Six-x-clear, LCH ltd rulebook** and **default rules**, **LCH SA**, **EuroCCP**.*

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