



How central counter- parties strengthen the safety and integrity of financial markets

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Executive summary

The financial crisis in 2008 unearthed three root causes of systemic risk: excessive risk taking, interconnectedness of market participants, and insufficient collateralisation. Following the financial crisis, regulators, policy makers and market participants have put tremendous efforts in addressing systemic risk in order to prevent future crisis and the associated high costs for the public. The primary tool for doing this is central clearing via central counterparties (CCPs), focusing on a clearing obligation for over-the-counter (OTC) derivatives, which will increase the importance of CCPs.

In light of these developments, the time is right for a fact-based review on CCPs and how they contribute to the safety and integrity of financial markets, particularly with respect to reducing systemic risk. Essentially, a CCP is a mechanism to handle counterparty credit risk. By making the default management and loss allocation explicit, a CCP creates the system through which contagion and uncertainty can be mitigated. Central clearing thus brings a market together, and establishes both individual and mutual incentives for its users to safeguard the market. If one wants to address systemic risks, one needs CCPs. CCPs are not risk takers or investors in the sense of their members, but they do concentrate risk management. While it is highly desirable to do so in a neutral party, it requires strenuous CCP governance and prudent risk standards.

This white paper finds that central clearing significantly reduces systemic risks and their amplifying factors in financial markets in several ways: CCPs serve the financial system in a unique way as transparent independent risk managers. They prevent the build-up of excessive risk. A centrally cleared market

structure reduces interconnectedness of market participants. Because CCPs' multiple lines of defence are available to serve as loss absorbers, they mitigate defaults and protect the market against shocks that would otherwise have devastating effects in an un-cleared market with insufficient collateralisation.

This white paper also stresses the pre-requisites for CCPs to perform their important function. CCPs must adhere to the highest quality standards, as, for example, set out by EMIR. These include governance and incentive structures, prudent risk management standards, high quality operational capabilities and liquidity arrangements. Last but not least, CCPs must continue to serve as trusted, stable counterparties by providing transparency to their users and stakeholders.

To ensure that CCPs can respond appropriately if confronted with unprecedented and unforeseen events, mechanisms and tools shall be in place that enable the recovery of viable CCPs and the resolution of unviable ones. These recovery and resolution plans will ensure that in scenarios that overwhelm expectations, CCPs are a mechanism to manage their impact and mitigate uncertainty, as well as ensure positive ex ante incentives for the CCP and its participants.

CCPs have proven their capabilities in the past financial crisis, and the extension of their use for previously lightly regulated and under-collateralised markets is underway. In anticipation of this, CCPs have been refined and improved through various regulations to enshrine their best features, and work is underway to establish robust back-stop measures. To conclude, the use of well-designed CCPs will create a resilient financial market structure, suited to handle crises in a controlled and effective manner.

Preface

This white paper is the third in a series from Deutsche Börse Group and Eurex Clearing on the global derivatives market. “The Global Derivatives Market – An Introduction” was published in 2008 and “The Global Derivatives Market – A Blueprint for Market Safety and Integrity” followed in 2009, which outlined the imperatives for the derivatives market structure. Together, these publications built a solid foundation for understanding derivatives markets and accompanying risks, as well as potential risk mitigation measures.

Since 2009, a new regulatory regime is being progressively introduced. Its overarching goals are increasing the stability of financial markets, in particular

by reducing systemic risk. The implementation of these regulations, especially the clearing obligation for over-the-counter (OTC) derivatives, increases the importance of central counterparties (CCPs) in financial markets. Based on the significant role of CCPs, the time is right for an evidence-based discussion concerning the role of CCPs in strengthening the safety and integrity of financial markets, and specifically their systemic risk mitigation.

Building on the previous white papers on the derivatives markets, this white paper focuses on how centrally cleared markets¹⁾ and CCPs manage systemic risk, with a focus on the OTC derivatives market and the regulatory environment of EMIR.

1) „Clearing means the process of establishing positions, including the calculation of net obligations, and ensuring that financial instruments, cash, or both, are available to secure the exposures arising from those positions“ (See EMIR Article 2, Paragraph 3). For a more detailed description of the derivatives value chain next to clearing see Deutsche Börse Group 2008.

1. Regulatory efforts addressing systemic risks

In recent years, tremendous energy has gone into improving the resilience of the global financial system. A prime objective of these efforts was to eliminate systemic risk, which was widely seen as exacerbating the crisis, if not creating it. Systemic risk can be defined to be the risk that the failure of one counterparty has adverse effects on other market participants, potentially threatening the functioning of an entire market or of the financial system as a whole.²⁾

The financial crisis in 2008 has shown the devastating effects of systemic risk: market participants that were considered “too big to fail” had to be recapitalised to avoid losses for their counterparties and preserve critical services. As a consequence, tax payers were confronted with high costs for the bail-out of financial institutions and the overall economy suffered from disruptions in the efficient allocation of capital.³⁾

Three root causes of systemic risk became apparent in the financial crisis of 2008:

- excessive risk taking
- interconnectedness of market participants
- insufficient collateralisation of market and credit risk

Excessive risk taking by market participants has been a major problem during the financial crisis. Risk taking is excessive if a counterparty is clearly unable to absorb the potential losses of its activities. Reasons for excessive risk taking are not limited to misaligned incentives, but also deficiencies in controlling and pricing risk. Inadequate transparency on the magnitude and location of risk hinder any attempts to control and value risk.

Interconnectedness of market participants means the threat of a domino effect among market participants. The failure or suspected failure of a single counterparty impacts other market participants, threatening, in turn, their own viability. Threats from interconnectedness are compounded if the exposures and loss transmission between counterparts are opaque. During the recent crisis, uncertainty and loss of confidence was in particular amplified by OTC derivatives, and the lack of organised and readily available information on the actual counterparty credit risk exposure exacerbated concerns about the major counterparties’ potential defaults on each other.

Last but not least, **insufficient collateralisation of market and credit risk** drives systemic risk in a market.⁴⁾ A key concern is if risk models are adequately considering potential worst case scenarios. Is the risk protection consisting of capital and liquidity sufficient to buffer financial market shocks? In the financial crisis many risk models proved to be inadequate.

Regulators, policy makers and market participants alike are addressing these concerns about both market structure and risk management in order to prevent systemic risk build up ex ante, and mechanisms to handle it in times of crisis. Regulatory reforms are in particular focusing on the OTC derivatives market, as this only lightly regulated market took centre stage as a weak point during the crisis.

A review of the functioning of OTC derivatives markets during the financial crisis revealed severe weaknesses in risk mitigation and bilateral clearing.⁵⁾ These issues, coupled with general opacity and operational shortcomings, made the OTC markets a source of uncertainty and compounded the crisis.

2) See Bank of England 2014 and European Commission 2012

3) See European Commission 2012

4) See European Commission 2009b

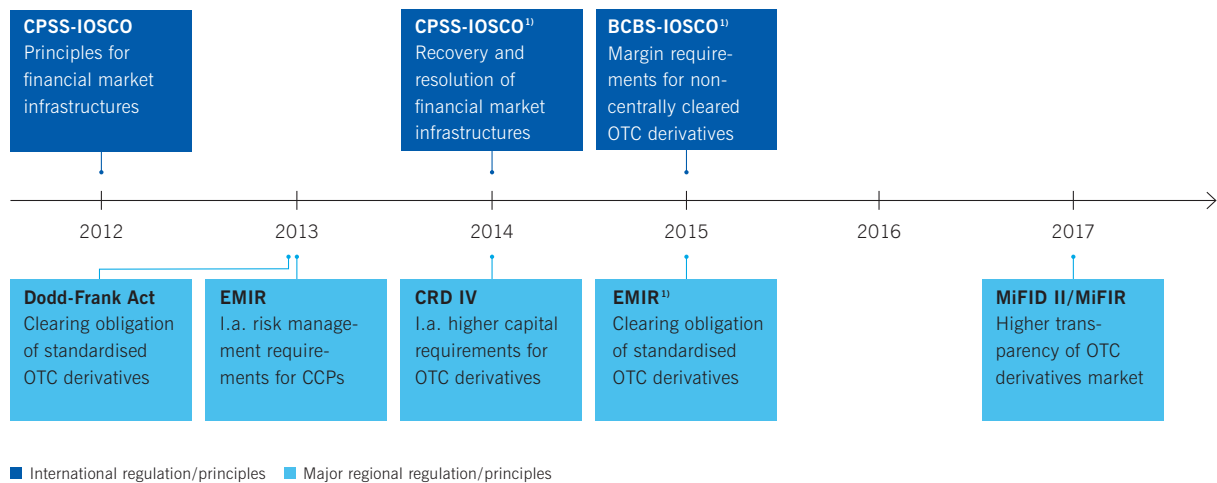
5) See European Commission 2009a

To address these shortcomings, CCPs have been advocated around the world, because they had proven their contribution to increasing safety of financial markets by providing assurance to their members and enabling trading to continue without equivalent counterparty credit risk concerns. Along these lines, the G20 leaders stated after their summit in Pittsburgh in 2009 that they want to improve the OTC derivatives market by central clearing with regulatory implementation aiming to “improve transparency in the derivatives markets, mitigate systemic risk, and protect against market abuse”.⁶⁾ The implementation

of several regulations to improve the resilience of financial markets has started since then (Exhibit 1).

Following the progressive implementation of the new regulatory regime, the market structure of the derivatives market has already begun to change. The share of central clearing has substantially increased since Deutsche Börse Group has first addressed the topic of risks involved in the derivatives market in its white paper „The Global Derivatives Market – A Blueprint for Market Safety and Integrity“ 2009.

Exhibit 1: Start dates of progressively implemented OTC derivatives market regulations



1) Expected starting date of progressive implementation

By mid-2013, OTC derivatives still constituted the largest fraction of the derivatives market, although a greater portion of OTC derivatives were centrally cleared. Furthermore, the collateralised exposure was larger than the uncollateralised exposure (Exhibit 2a).

As the reforms are further implemented, the share of centrally cleared OTC derivatives is expected to grow (Exhibit 2b).

Exhibit 2a: The derivatives market today

June 2013

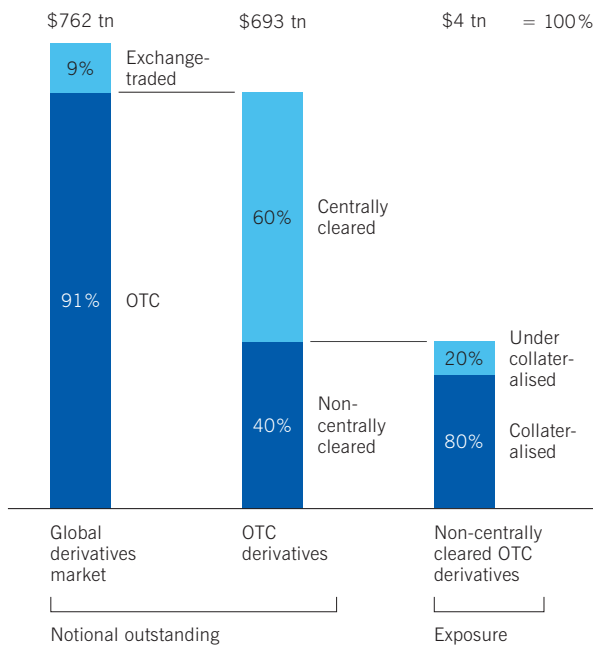
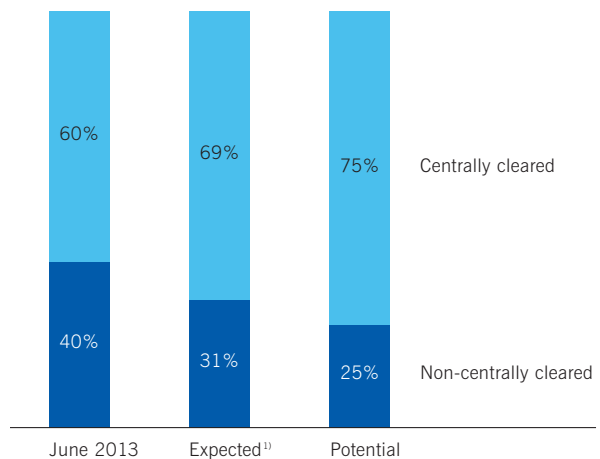


Exhibit 2b: Outlook of central clearing of OTC derivatives

Extent of central clearing of OTC derivatives in terms of notional outstanding



1) Expected level of central clearing once the clearing obligation is implemented. Source: FSB 2013 a, ISDA 2013, ISDA 2014b, Macroeconomic Assessment Group on Derivatives 2013

Source: BIS 2013, FSB 2013a, ISDA 2013, ISDA 2014a, ISDA 2014b

Risks remain in the non-centrally cleared OTC derivatives market

Approximately \$170 trillion of notional value in OTC derivatives would remain in the non-centrally cleared market, assuming that central clearing had already realised its full potential by mid-2013, i.e. that 75 per cent of all OTC derivatives were centrally cleared. With the conservative assumption that the relation of exposure to notional outstanding remains constant, netted counterparty credit exposure in the non-centrally cleared market would amount to approximately \$2 trillion.⁷⁾ These large exposures show that risks remain in the non-centrally cleared market with banks and shadow banks. This is critical in the light of potential failures of financial institutions, particularly with regards to the shadow banking space.

7) Ratio of exposure to notional outstanding is calculated with BIS 2013, ISDA 2013, ISDA 2014b and FSB 2013a data.

In light of the regulatory efforts and public concerns about systemic risk of derivatives markets, this white paper reviews how CCPs reduce systemic risks in financial markets and the resilience of CCPs themselves.

The following chapter discusses in detail how CCPs mitigate systemic risk. Ensuring that CCPs and their risk mitigants are prudently structured, managed and operated, in order to fulfil their tasks effectively is core to Chapter 3. The final chapter presents the key conclusions.

Exhibit 3: Differences between clearing houses, CCPs and qualifying CCPs

	Clearing house	CCP	Qualifying CCP
Description	<ul style="list-style-type: none"> Establishes, records and ensures the processing of its users' obligations 	<ul style="list-style-type: none"> Interposes itself legally between the counterparties of a trade Ensures the future performance of positions through counterparty credit risk management 	<ul style="list-style-type: none"> Registers with regulators to operate as a qualified CCP Complies with CPSS-IOSCO principles for financial market infrastructures
Capital requirements for trade exposures	<ul style="list-style-type: none"> Depending on the credit rating of the counterparty Risk weights range between 20% and 150% of trade exposure¹⁾ 	<ul style="list-style-type: none"> Depending on the credit rating of the CCP Risk weights range between 20% and 150% of trade exposure¹⁾ 	<ul style="list-style-type: none"> Risk weight of 2% of trade exposure
History	<ul style="list-style-type: none"> Since the 19th century 	<ul style="list-style-type: none"> Since the early 20th century 	<ul style="list-style-type: none"> Currently being introduced

⊕ Additional characteristics

1) Based on the standardised approach to credit risk

Source: BCBS 2006, BCBS 2014, Bank of England – Rehlon, A./Nixon D. 2013, EACH 2009, Norman, P. 2011

Central clearing and the CCP landscape

Central clearing is not a recent innovation. Its long-standing tradition dates back to the late 19th century, in the form of commodity clearing houses. Ben Bernanke, former chairman of the U.S. Federal Reserve, stresses that “[for] more than a century, financial stability has depended on the resilience under stress of clearing houses and other parts of the financial infrastructure.”⁸⁾ The evolution of financial market infrastructures (FMIs) involved in central clearing started with clearing houses and has advanced to CCPs and, most recently, qualified CCPs. These forms of FMIs are different with regards to their legal position in the clearing market, the risk management standards they have to fulfil and the capital requirements their counterparties face (Exhibit 3).

The CCP landscape is global, with a large share of derivatives traded and cleared in Europe and North America. Globally there are around 100 CCPs, of which 28 are based in Europe and 20 in North America.⁹⁾ Prominent CCPs are, for example, CME Clearing, Eurex Clearing, ICE Clear and LCH.Clearnet. Of all global CCPs, 32 CCPs from outside of Europe have applied for recognition under EMIR.¹⁰⁾ Some CCPs are focused on a single country or region, while others cover multiple geographies. Likewise, CCPs can focus on a single product category or many different ones.¹¹⁾ The variety of CCP set-ups has implications for comparisons of centrally and non-centrally cleared markets. For example, large multi-product CCPs are more likely to achieve higher netting efficiencies.¹²⁾ Following the recent drive to clear more OTC derivatives centrally, 25 CCPs had built up the capabilities to clear OTC derivatives by mid-2013.¹³⁾

8) See Bernanke, B. 2011

9) See CPSS 2013, CCP12 2013, ESMA 2014a, ESMA 2014b, FSB 2013, FOA 2013 and CCP websites

10) See ESMA 2014a

11) See Deutsche Börse Group 2009. The white paper provides an overview of the financial instruments universe.

12) See Macroeconomic Assessment Group on Derivatives 2013

13) See FSB 2013b

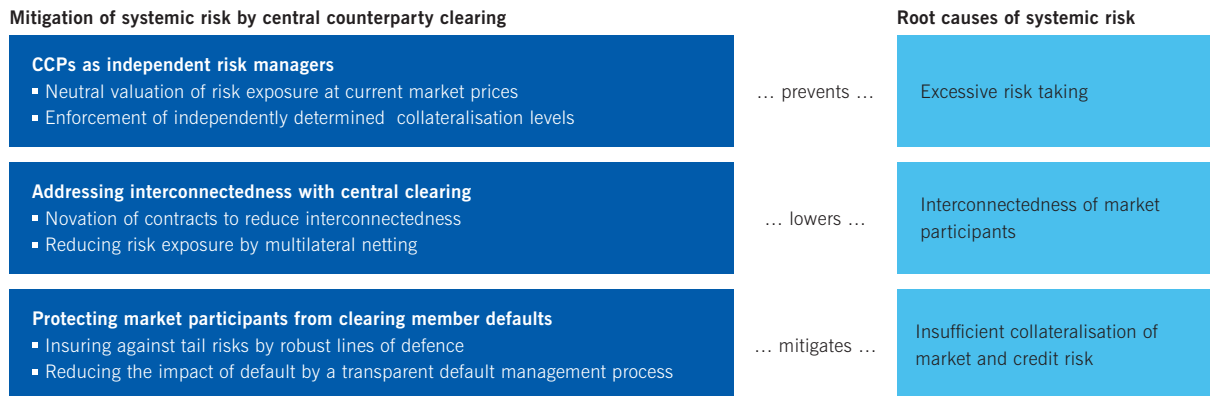
2. How CCPs reduce systemic risk in the financial system

Systemic events evolve differently in centrally and non-centrally cleared markets, because of the distinct characteristics of CCPs and market participants, as well as the underlying market structures. These differences determine how effectively systemic events can be mitigated.

Firstly, it is shown how CCPs prevent excessive risk taking by being independent risk managers. Secondly, it is described how the effect of a CCP's central position in the market reduces interconnectedness of market participants. Thirdly, it is explained how CCPs work as shock absorbers and thus avoid domino effects and uncertainty that are caused by counterparty defaults.

The following chapter details how CCPs mitigate the three root causes of systemic risk as shown in Exhibit 4.

Exhibit 4: How CCPs reduce systemic risk in the financial system



2.1 CCPs as independent risk managers

CCPs are independent risk managers, because they only step into a trade concluded between two of their members, but do not trade on their own. By interposing themselves as the legal counterpart to both the original buyer and seller, the CCP assumes the performance of the transaction should one of the original trading parties fail. The original trading parties enjoy or suffer the normal profits and losses of the trades, passed between them through the CCP. The CCP's main source of income is fees based on these transactions, supplemented with various other services such as collateral management charges. Hence, the CCP is neutral to the profits and losses from the contract, but it bears the risk of losses while ensuring the surviving member's trade in the event of a counterparty default.

To guard against such possible losses, CCPs charge "margin" collateral from the original trading parties. The essential construction of a CCP is that it charges clearing members collateral regardless of their counterparty risk. The collateral reflects the CCP's expected worst-case losses required to guarantee fulfilment of the side of the trade towards the non-defaulter. As such, the CCP is a guarantor of contracts towards its non-defaulting members, and must ensure it can manage any default(s).

Neutral valuation at current market prices

The independent position of CCPs is reflected in the transparency of their valuation of all positions, including OTC derivatives. The pricing methodology CCPs use are the same for any participants with the same trade, and are included in the CCP reporting to the

parties. No counterparty is favoured over another. Accurate pricing is essential to ensure that CCPs correctly collateralise the trades, so that affected members pay and receive the correct sums in the variation margin process. The profits and losses, or "variation margin", is exchanged at least daily between the two sides of the trade through the CCP to ensure that losses do not accumulate. In centrally cleared markets, all members and clients with the same trade exchange variation margin based on the same transparent valuation. If the valuation were incorrect, systemic risk would build up because the risk exposure would not be accurately reflected in the collateralisation of the transactions.

Enforcement of independently determined collateralisation

In addition to the variation margin process to cover the current valuation of the contracts of their members, CCPs also charge collateral, called "initial margin", to reflect possible future changes in the value of the contracts. Its level reflects possible close-out costs of a position and ensures that the CCP is able to fulfil its guarantee towards its non-defaulting clearing members. Position and price changes are considered continuously, preferably on a real-time basis.¹⁴⁾

This means that any clearing member must have sufficient collateral placed at the CCP at all times for the risk inherent in their open positions, as determined by the CCP. As the CCP faces possible losses in case of default of a clearing member, it is strongly incentivised to set margin requirements conservatively.

14) Eurex Clearing's intra-day margining provides real-time position and price updates based on an intra-day risk valuation which uses current prices and volatilities.

While there is a funding cost to clearing members related to margining of trades, prudent levels of collateralisation benefit them since it provides insurance against the impact of the default of a clearing member. This substantially reduces the counterparty credit risk, which the CCP transforms into margin requirements towards its members. This has the positive effect of ensuring that members cannot undertake risks which they cannot afford to collateralise.

Closing out concentrated positions, or large market shares, is generally harder. Typically, CCPs scale their initial margins for concentrated positions, demanding higher margins for positions with more difficult close-outs. These proven measures have also been incorporated in the latest CCP legislation.¹⁵⁾ In contrast, monitoring and managing concentration risk in non-centrally cleared markets is much more difficult, as information on true market share and positions are not visible even to direct counterparties and no central function exists for this.

AIG case study: Excessive risk taking and lack of risk management skills

The history of American International Group (AIG) demonstrates the potentially devastating effect of insufficient risk management due to diverging incentives and lack of skills within a risk-taking financial institution. AIG, the largest industrial and commercial insurer in the US in 2007, was brought to the edge of collapse by inadequate risk management of a credit default swap (CDS)-issuing subsidiary.¹⁶⁾ This subsidiary built up a derivatives portfolio with a notional value of \$2.7 trillion, including around \$440 billion of CDS, without properly managing the risk of the portfolio internally or being required to put up sufficient collateral.¹⁷⁾ In other words, AIG's subsidiary effectively sold insurance without the ability to absorb losses.

Next to diverging incentives, AIG suffered from a lack of risk management skills: In August 2007, Joseph J. Cassano, Head of AIG Financial Products Division, stated that "it is hard for us, without being flippant, to even see a scenario within any kind of realm of reason that would see us losing one dollar in any of those transactions."¹⁸⁾ Eventually, the US government had to bail out AIG with \$182 billion in 2008 to avoid a collapse of this systemic institution.¹⁹⁾ This experience demonstrates that financial institutions are inclined to take on risks and how misalignment of incentives between business units and the risk management function can lead to high systemic risk in the market.

However, the excessive risk of the CDS portfolio of AIG was not only caused by failure of internal risk management. The bilateral counterparties of AIG's subsidiary did not require appropriate collateralisation of CDS transactions, given AIG's AAA credit rating. In contrast, a CCP would have initially demanded collateralisation to cover the risk exposure despite AIG's exemplary credit rating.²⁰⁾ Accordingly, the International Monetary Fund (IMF) noted in 2010 that AIG's uncollateralised exposures would not have grown systemically critical had there been appropriate collateralisation, as demanded by CCPs.²¹⁾

15) See EMIR Technical Standards 2013 Article 52

16) CDS are derivatives that insure against the default of a market participant and may thus be linked to the business of an insurance company.

17) See Norman, P. 2011

18) See New York Times 2008

19) See U.S. Treasury 2012

20) See Norman, P. 2011

21) See IMF 2010

2.2 Addressing interconnectedness

In the event of one or several member defaults, a CCP protects other market participants by reducing interconnectedness, one root cause of systemic risk, in two ways: firstly, with a CCP stepping into their trades, market participants face a smaller number of “pure” risk managers. The CCP which replaced their original counterpart is known to transparently keep collateral from the original trading counterparties to secure the trades; secondly, they reduce risk exposure of market participants via multilateral netting.

Novation of contracts

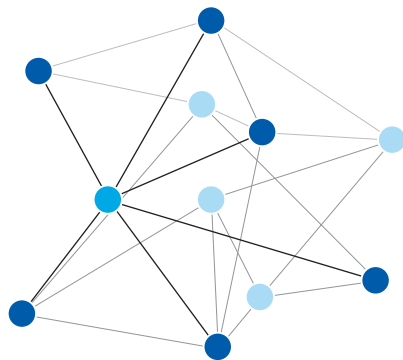
CCPs legally step into the trades of market participants in a process called novation and replace the original counterparties' exposure to each other with that of the CCP. Consequently, for cleared derivatives, market participants face a smaller number of

counterparties, given the limited number of CCPs. This reduces interconnectedness amongst trading participants.

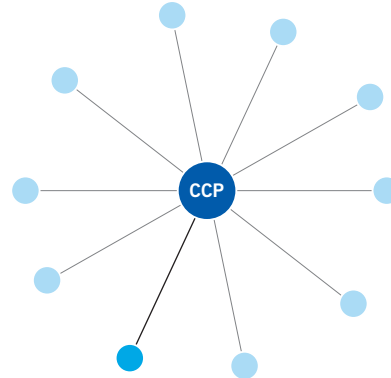
In case of a default, only the CCP is directly affected, while other market participants remain uninvolved (Exhibit 5). The CCP and non-defaulting members' mutual contributions are affected if the CCP's default management process and margin from defaulting member did not suffice. The desire to minimize contagion from a defaulter by CCP and its members, once its effect is made transparent, is one of the built-in incentive and governance structures that has historically maintained high risk standards in centrally cleared markets. Of course, the transparency of the CCP, in particular in terms of their risk management, mitigates any panic from counterparty uncertainty as to the safety of their trades.

Exhibit 5: Effect of a counterparty default in a non-centrally and centrally cleared market

Default in a non-centrally cleared market



Default in a centrally cleared market



● Affected counterparty ● Defaulting counterparty ● Unaffected counterparty

Interconnectedness is further mitigated by CCPs as they also protect the clients of their members from losses in a default. So-called client asset segregation protects clients as it segregates the clients' assets and accounts, which are separated and shielded off from their clearing members.²²⁾ These clients are typically smaller banks and financial institutions, which are not directly linked to a CCP but rely on its services via an intermediary – the clearing member. If a clearing member defaults, its clients' segregated positions and collateral will not bear losses since their collateral will not be part of the insolvency estate. A defaulting clearing member is consequently “ring-fenced” in centrally cleared markets so that its clients are not directly affected.

Reducing risk exposure by multilateral netting

In addition to directly reducing interconnectedness, central clearing allows for multilateral netting. Multi-

lateral netting means that a clearing member's contracts can be netted with all its counterparties via the CCP. Without a CCP as an intermediary, two counterparties would only be able to net their mutual outstanding claims (bilateral netting). CCPs thus reduce the overall risk exposure for derivative market participants.²³⁾

Netting efficiency increases with the number and volume of contracts that can be netted against one another. Therefore, netting efficiency increases in line with the increasing use of CCPs in the derivatives market. Netting efficiency can be further enhanced if CCPs clear multiple asset classes.

Together, fewer, better connections and reduced total risk exposure lowers the interconnectedness of market participants, fostering stability and clarity during market turmoil.

Protection of client accounts by asset segregation

Client asset segregation protects the collateral of its clients if a clearing member defaults. In addition, positions and collateral are portable, meaning that they can be transferred from the defaulting to a non-defaulting clearing member so that they do not need to be closed out after a clearing member's default. This system thus extends security to the clearing member's clients. The ease of portability depends on the choice of the asset segregation model. Individual client asset segregation fosters portability because each client can choose its own new clearing member. A second approach is omnibus client asset segregation. In that case, all clients agree to be ported to a single clearing member who accepts the pool of clients.

22) EMIR Article 39 obliges CCPs to keep segregated records and accounts for each client of a clearing member. Clients have a contractual relationship with a clearing member of a CCP enabling the client to clear its transactions with that CCP. The CCP collects the required collateral via the clearing member.

23) See Bernanke, B. 2011

2.3 Protecting market participants from clearing member defaults

CCPs can mitigate the build-up of excessive risk and reduce interconnectedness for the markets cleared through them, but market participants can and do still default. If a clearing member defaults, CCPs protect non-defaulting clearing members and serve as shock absorbers for them. To provide a secure guarantee of the contracts towards the non-defaulting parties, CCPs employ the margins of the defaulter and its lines of defence – additional funds from the CCP and its members to protect against extreme tail events. To rebalance the CCP, a robust default management process is undertaken.

Insuring against tail risks by robust lines of defence

CCPs are designed to effectively protect clearing members and their clients against the effects of a member default (and its clients). In case the collateral of the defaulting clearing member is insufficient to cover losses, CCPs and their clearing members use mutual funds. Jointly covering tail risk scenarios is more effective than covering these scenarios individually, which increases the safety of clearing members and the CCP. These substantial funds make a CCP far safer than simply charging members margin. Stated differently, contrary to non-centrally cleared markets, clearing members are additionally protected against market and credit risk by CCP's multiple lines of defence that absorb the impact of a default (Exhibit 6).

Absorbing shocks by the defaulting member's margins

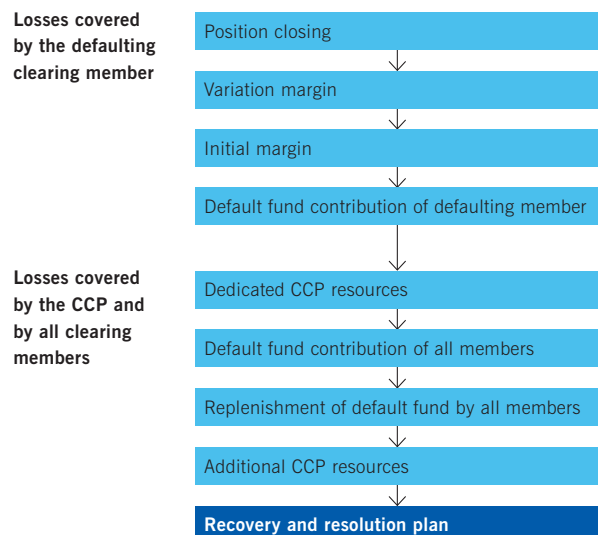
Any losses caused by the closing of a position are first covered by margins of the defaulter. CCPs charge

conservative initial margins and cover the expected market exposure with a minimum of 99.5 per cent confidence for OTC derivatives in line with EMIR, although the actual confidence levels are often more conservative in practice. The losses of recent defaults, such as Lehman Brothers and MF Global, were covered by initial margin and thus did not affect other clearing members or CCPs.²⁴⁾

Clearing members are also obliged to contribute to the CCP's default fund. This contribution usually consists of a standard minimum plus an amount proportional to the risk exposure. If a clearing member defaults, its contribution mitigates losses not covered by its margin before the CCP's dedicated resources are touched.

Exhibit 6: A CCP's lines of defence

Loss allocation to reduce the impact of a clearing member default



24) MF Global was a major global financial derivatives broker which defaulted in 2011 after running out of liquidity. Reasons for illiquidity included an aggressive trading strategy and inadequate risk management. See Financial Times 2011

Absorbing shocks by loss mutualisation

If the defaulting clearing member's margins and contribution to the default fund are insufficient to cover losses, the CCP's resources and loss mutualisation via the default fund prevent losses from spreading in an uncontrolled manner.

CCPs must inject a substantial share of their reserves to mitigate the losses before mutualising them among clearing members. The CCP has "skin in the game" – not only an additional line of defence, but also a strong incentive for prudent risk management.²⁵⁾

The next line of defence is the remaining default fund of all clearing members. The default fund and other pre-funded resources of the CCP are calibrated so as to withstand at least the default of the worst two members in extreme but plausible scenarios.²⁶⁾ A CCP's default fund shares the losses across all clearing members and thus acts like an insurance scheme for tail risk in financial markets. CCPs may request clearing members to replenish the default fund, though typically to a capped amount.²⁷⁾

Such lines of defence are a robust mechanism to absorb a default of clearing members. They ensure that for all except the most extreme scenarios, non-defaulters are unaffected. If the defaulter's collateral

was exhausted in a severe tail event, then the mutualisation provides a deep pot by spreading the impact to a wide range of members in small chunks.

Reducing the impact of default by a transparent default management process

A crucial feature of the CCP risk mitigation tools is the default management process. This process must be, as with the other components of CCPs, transparent and have a strong legal basis. While flexibility to respond to crisis is highly desirable, CCPs and their members have an established default management process that follows a clear structure – as opposed to the disorderly wind-down in non-centrally cleared markets. This transparency limits uncertainty and fosters confidence in reliable default handling.

The first step in the default management process is to begin the transfer process of the defaulting clearing members' clients. This includes separating client assets and thus assuring all market participants that the default will not directly lead to domino effects. By offering segregated accounts in line with EMIR, CCPs protect non-defaulting clearing members and clients from the impact of default of another clearing member (see box on client asset segregation). Positions and the corresponding collateral of clients of the defaulting clearing member are transferred – or

Replenishment of a default fund

The following example illustrates the extent of a clearing member's potential replenishment exposure. In 2012, the average default fund for a leading CCP was roughly €2.8 billion.²⁸⁾ Conservatively assuming that the largest clearing member accounts for 10 per cent of this exposure and a capped default fund can be replenished twice, the maximum replenishment obligation of the largest non-defaulting clearing member is roughly €560 million.

25) See EMIR Article 45 for an example of relevant regulation

26) See EMIR Article 42 and Article 43 for default coverage requirements

27) For example, replenishment can be based on the initial default fund contribution of the respective clearing member, whereby the obligation typically ranges between 100 per cent and 275 per cent of the initial contribution. The obligation can also rely on other criterion, such as stress-testing scenarios. See Bank of England – Elliot, D. 2013a

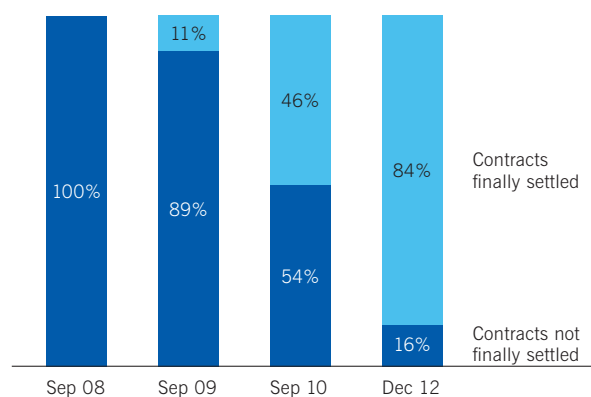
28) Based on Eurex Clearing, CME Clearing, ICE Clear Europe, LCH.Clearnet (retrieved from company website)

“ported” – to stable clearing members.²⁹⁾ By contrast, in non-centrally cleared markets, the positions of a defaulting institution and its clients are not subject to a standard default process defined by a central institution, but are subject to individual and bilateral legal arrangements among the involved parties. The insolvency of a broker in non-centrally cleared markets typically results in clients facing restricted access to their accounts, which poses a significant risk for market stability.³⁰⁾

The second step for the CCP is to rebalance its books, after the side of a trade between the CCP and the defaulting member is terminated. This termination is immediate for CCPs, based on its rulebook which outlines the triggers. Once such a trigger is ascertained, the CCP will re-establish identical contracts with other market participants. This process is generally completed between two to five days, with the CCP hedging the main market risks before holding auctions for sub-portfolios.

Exhibit 7: Settlement of Lehman Brothers' non-centrally cleared OTC derivative claims

Settlement in terms of number of contracts



Source: Federal Reserve Bank of New York – Fleming, M./Sarkar, A. 2014

In comparison, for bilateral markets, each counterparty of the defaulter must conduct its own termination. Exhibit 7 illustrates with the example of Lehman how long the process to settle non-centrally cleared derivatives can take. Such a delay can lead to significant uncertainty and increase the risk of contagion, as counterparties do not have access to potential claims which proceeds they might need to fulfil their own obligations.

Under the ISDA Master Agreement, which is the legal basis for most non-centrally cleared OTC derivatives, contracts are only automatically terminated in case of default if they include an automatic early-termination clause.³¹⁾ Otherwise, non-defaulting counterparties have the right to individually determine a termination date and hence valuation date for settlement within a certain timeframe.³²⁾ If the defaulter has an unrealised gain in the transaction, non-defaulting counterparties can also choose not to terminate the contract for a certain time period while withholding periodic payments. This flexibility unfortunately leads to legal disputes and lengthy settlement periods as seen after the default of Lehman Brothers, when the settlement of non-centrally cleared contracts took several years.³³⁾

In summary, the structural advantages of centrally cleared markets combined with the effective mitigation of the impact of systemic events by CCPs outlined above explain why CCPs can be regarded as “systemic risk managers”.³⁴⁾

29) Portability might not be feasible due to, e.g., different jurisdictions and client requirements of clearing members. If portability is not feasible or desired, the clients' contracts go through the same process as the positions of the defaulting clearing member.

30) See Federal Reserve Bank of New York - Fleming, M./Sarkar, A. 2014

31) See ISDA 2002 Master Agreement Section 6(a)

32) See Jackson, T.H./Scott, K.E./Summe, K.A./Taylor, J.B. 2011

33) See Federal Reserve Bank of New York - Fleming, M./Sarkar, A. 2014

34) See Tucker, P. 2014

3. Ensuring the safety and integrity of CCPs

The previous chapter explained the risk reducing effect of central clearing on markets. For suitable products, a CCP mitigates the systemic risks and brings substantial benefits for market participants. However, due to their central role, CCPs themselves become a systemic element of market structure. This chapter analyses how to ensure the safety and integrity of the CCP's model in the new regulatory framework. Addressing this question has three aspects:

1. A micro-prudential perspective: the resilience of CCPs themselves
2. A macro-prudential perspective: the stability of the market structure in cleared markets
3. The recovery and resolution toolkit: preventing CCPs from being “too big to fail”, and how to handle disruptions in an appropriate manner

The first point combines both the safety of the CCP as an entity in itself, and the risks it may face as a

regular company, as well as the level of calibration set for its risk management to cover potential defaults. The second point concerns the overall market structure to balance the consequences of central clearing. The final point requires the distinction between the failures of a particular CCP versus a market failure. This enables a “CCP problem” or a “market problem” to be addressed in the appropriate way, preventing CCPs from being “too big to fail” and providing a toolkit to continue or close down a market as desired.

Accordingly this chapter first describes essential quality standards, which all CCPs should meet so that they do not create risks themselves. It then elaborates on the requirements CCPs need to fulfil to cope with external risks from a stressed market environment, analysing how CCPs have fared in past crises of the financial system. From here, the market structure of centrally cleared markets is discussed. Finally the chapter describes recovery and resolution plans for CCPs as a last resort in worst-case scenarios.

3.1 Setting highest quality standards for CCPs

CCPs need to adhere to the highest quality standards, so that they can effectively and efficiently manage risks. This has been a focus of regulation in Europe and the US. These standards should prevent disruptions of CCPs themselves and ensure the continuation of the operations of the CCP at any time. They comprise the governance and incentives of CCPs, their risk management, liquidity management and operations.

Quality standards for CCPs

Governance and incentives. CCPs need to have a clear and highly effective governance structure to quickly identify potential risks and resolve disruptions which might occur. The governance structure also needs to be transparent to build trust among a CCP's clearing members.³⁵⁾ One key component is a transparent risk management process which should be monitored by the CCP's key stakeholders, i.e. its clearing members, clients and regulators. The governance structure should also include committees³⁶⁾ of CCP participants, so they have transparency on the CCP's key processes and risk management capabilities and can contribute to their continuous enhancement.

In addition to a clear, highly effective and transparent governance structure, CCPs must retain their incentives for conservative risk management which served them well during the crisis.

A natural concern is that CCPs may “compete on risk”, by lowering their standards to attract customers with lower collateralisation levels, and to spare themselves costs for operational effort of delivering a fit-for-purpose solution. Historically, CCPs have been, even without regulation as attentive as post-crisis, extremely conservative for two primary reasons.

The first is the mutualisation aspect across the membership. While Initial Margin is a funding cost to the participants, lowering these values naturally increases the likelihood instead of to a shared tail-loss through the Clearing Fund. The members of a CCP are typically extremely sensitive to possible losses deriving from the default of other members, and adverse to the benefits of an implicit higher mutualisation. The knowledge that CCPs treat the counterparties with strong risk management standards is a key selling point to a CCP's users, and CCPs which attempt to compete in such a way have extremely limited appeal. Transparency and governance enable the members of a CCP to address any such concerns, and this positive feature is one of the critical risk mitigation tools that must be kept going forward.

The second aspect is the incentives, or rather disincentives of CCPs themselves. A private for-profit CCP makes its revenue from fees for the trade processing. These are a very small fraction of the overall profit and loss that the trades may bear the participants of a CCP. However, the CCP has its own capital included in the Lines of Defence, and as such faces disproportionate losses should it understate the collateralisation requirements. Exposing CCP capital to losses from defaults, while returning any surplus from successful ones, is one of the strongest incentives possible to ensure that risks are covered most prudently. There is a considerable asymmetry between possible fee revenue increases by lowering risk standards and the potential losses in case of a member default. This difference is most pronounced in private CCPs, as it is their own capital at stake.

Furthermore regulation of CCPs should ensure that the prudent incentives for the members and CCP are not distorted, and to intervene if they appear to be failing.

35) See EMIR article 26

36) See EMIR article 28

Risk management. A core element of a CCP's business is to protect its clearing members from losses resulting from the default of any others. As risk managers CCPs need to have a state-of-the-art risk management in place. Firstly, the CCP has to correctly price the latent exposure arising from a clearing member's portfolio. Then, the exposure must be collateralised by prudent margin levels. In order to mitigate the pro-cyclicality of margining, CCPs need to integrate stressed market situations into their margining calculation. They need to apply appropriate haircuts to the collateral, and account for concentrations therein, to cover losses even under stressed market conditions. Moreover, CCPs need to be able to ensure that they can enforce margin calls under all market conditions and at a speed appropriate for the asset class. Finally, all CCPs should have a prudent investment policy in place for the cash collateral they collect.

Liquidity management. While the primary function of a CCP is the counterparty credit risk management, robust liquidity reserves and sources are necessary for the orderly operation of the former. CCPs need sufficient liquidity reserves in case of a clearing member default to cover the member's variation margin payments and settlements to its counterparties. The CCP's liquidity reserves and lines ensure the smooth operation of the market while the positions of the defaulting member(s) are being closed. EMIR requires CCPs to consider, as with the Lines of Defence, the "worst two" Clearing Members' defaults in terms of liquidity requirements. The liquidity lines, and the liquidation of collateral, even with conservative haircuts, are expected to be challenging during a member default. In addition to diverse commercial liquidity sources, access to central bank liquidity in exchange of collater-

al is a very useful backstop for a CCP, especially to mitigate pro-cyclical effects. CCPs which have access to central bank liquidity do not have to rely on market participants that are likely to be affected themselves by the severe market conditions surrounding the default of a clearing member. This is especially pertinent to remove further links which may either be broken or create inter-linkages during a crisis, in particular since the members of CCPs are usually the very firms it obtains its commercial liquidity lines from.

Operations. Another key quality standard CCPs have to meet is that they need to be capable of monitoring and prudently managing risk arising from their operations. This is important in order to minimise any negative impact that disruptions could have on their clearing members. Business continuity plans need to be in place that address sources of risk for CCPs' operations, in particular related to the workforce and IT infrastructure. The objective of these plans is to prevent potential failures and minimise the downtime of a CCP's operations in case of operational disruptions. These plans require clear allocation of responsibilities and escalation procedures.

Lessons learned from past defaults

In case the above described quality standards are not enforced properly, CCPs can actually experience disruptions and hence cease to be a stabilising factor for the markets and their clearing members. Past defaults of CCPs and other financial market infrastructures can serve as show cases to highlight what can happen and how to avoid future disruptions (Exhibit 8).

Exhibit 8: Lessons learned from FMI defaults in centrally cleared markets

Case study	Country and year	Reason for default	Learnings and today's mitigation mechanism
Hong Kong Futures Exchange	Hong Kong, 1987	<ul style="list-style-type: none"> Flawed governance structure: no incentive for adequate risk management Insufficient margin and default fund requirements 	<ul style="list-style-type: none"> "skin-in-the-game": equity before loss mutualisation State-of-the-art margining algorithms Regular stress testing of default fund
Caisse de Liquidation	France, 1974	<ul style="list-style-type: none"> Unauthorised trading by clearing members Insufficient margin requirements 	<ul style="list-style-type: none"> Adequate regulation and audits of clearing members State-of-the-art margining algorithms Need for recovery and resolution plans
Kuala Lumpur Commodity Clearing House	Malaysia, 1983	<ul style="list-style-type: none"> Accumulation of uncovered selling positions by one trader Management's inaction: lack of coordination with regulator and a FMI 	<ul style="list-style-type: none"> State-of-the-art risk management Rules regarding qualification of management Include market concentration measure in margin calculation
National Spot Exchange	India, 2013	<ul style="list-style-type: none"> Insufficient or missing commodities collateral as advertised: fraud No physical backing of commodities required Entering derivative contracts despite prohibition of regulator 	<ul style="list-style-type: none"> Regular audits Need for membership criteria State-of-the-art risk management

■ Issues in governance and incentives ■ Issues in risk management ■ Issues in operations

Source: Davison, I.H. 1988, Norman, P. 2011, Government of India – Forward Markets Commission 2013

All these past disruptions and defaults highlight the importance of highest quality standards for CCPs. These standards should be incorporated in jurisdictions globally to ensure the safety and integrity of the global financial markets and to discourage regulatory arbitrage. The basis for common global standards should be CPSS-IOSCO's principles for financial market infrastructures, which adequately reflect lessons learned from the addressed past disruptions and defaults.

The implementation of standards in the current regulatory framework

EMIR is one example of how these standards are converted into law. EMIR, which was adopted in 2012, sets minimum standards for CCP's operating within the European Economic Area. Exhibit 9 provides an overview of relevant EMIR articles along the four components outlined above.

Exhibit 9: EMIR sets minimum standards for CCPs

Standards	EMIR article (incl. technical standards)
Governance and incentives	
▪ Robust and transparent governance with clear organisational structure	▪ Article 26
▪ Experienced senior management	▪ Article 27
▪ External risk committee to advise CCP on risk management	▪ Article 28
▪ Suitable shareholder structure to ensure sound and prudent management	▪ Article 30
Risk management	
▪ Non-discriminatory and transparent membership criteria for clearing members with sufficient financial resources and operational capacity	▪ Article 37
▪ Lines of defence (default waterfall) including	▪ Article 45
– Margin requirements covering potential losses of OTC derivatives with 99.5% confidence over a 5 business day period and losses of other financial instruments with 99% confidence over a 2 business day period	– Article 41
– Stress period in initial margin calculation, weighted by at least 25%	– Article 41
– Default fund covering largest or combined second and third largest losses in extreme but plausible market conditions	– Article 42
– CCP dedicated resources covering losses exceeding the margins and the default fund	– Article 43
▪ Highly liquid collateral with minimal credit and market risk to cover exposures, taking into account liquidity and concentration risk on certain assets	▪ Article 46
▪ Detailed and actionable default procedures, enabling prompt action to safeguard the CCP and the wider market	▪ Article 48
Liquidity management	
▪ Maximum 25% of the credit lines from the same clearing member and associated institutions	▪ Article 44
▪ Daily measurement of liquidity needs in case the two clearing members with the largest exposure default	▪ Article 44
Operations	
▪ Clearly defined business continuity plan to ensure minimum service level of critical functions (e.g. 2 hours maximum recovery time for critical functions)	▪ Article 34
▪ Maintaining secondary processing and business sites for business continuity	▪ Article 34

Source: EMIR 2012, EMIR technical standards 2013

3.2 Absorbing shocks in the financial system

Even if CCPs follow the highest standards and internally arising risks are prevented, they still have to be prepared to cope with disruptions in the financial system. CCPs therefore need to have sufficient risk absorption capacities in place, which have to be updated on an on-going basis.

This section analyses how CCPs are set up to withstand stressed market environments. It starts by showing how CCPs fared during the latest financial crisis in 2008. Past market disruptions, including the crisis of 2008, are compared to a stress test of the robustness of the lines of defence which illustrates the safety of a state-of-the-art CCP under EMIR during market turmoil.

Resilience of CCPs during the financial crisis in 2008

CCPs handled recent defaults of systemically important market participants and adverse market movements without serious complications. In 2008, for example, CCPs were able to withstand disruptions and protect their clearing members from the default of Lehman Brothers.³⁷⁾ Losses resulting from the default were covered by the variation and initial margin of Lehman Brothers. This means that the CCPs and therefore also the non-defaulting clearing members did not experience any losses for the centrally cleared markets, and contagion was prevented. Further improved risk management supported by an adequate governance structure and stable liquidity access helped the relevant CCPs to cope even better with Lehman Brothers than CCPs facing significant adverse market movements during earlier crises, such as Black Monday in 1987.

Since regulating authorities adopted CPSS-IOSCO's standards and EMIR was introduced, CCPs in Europe have improved their risk management capabilities even further and strengthened their lines of defence.

Stress testing of CCPs' robust lines of defence

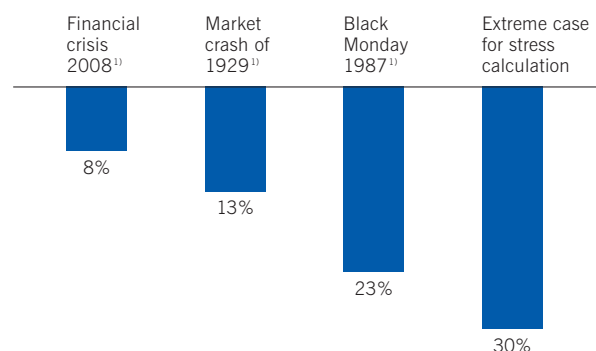
One component of the risk management standards is the risk absorption capacity of the lines of defence of CCPs. These need to be robust in all extreme but plausible market scenarios according to EMIR. In order to guarantee robustness, CCPs constantly conduct stress testing analyses based on current and past market movements and take historic and hypothetical extreme market events into account.

To simulate the robustness of a CCP's lines of defence in market environments even more extreme than the financial crisis of 2008 or Black Monday in 1987, the following analysis assumes a drop in the equity markets by 30 per cent within a single day. As Exhibit 10 shows, a stress scenario involving such a large one-day drop is an unprecedented event.

Still, this simulated extreme market disruption would deplete only less than half of the lines of defence of a CCP regulated by EMIR, based on an analysis with a representative portfolio (Exhibit 11). The analysis

Exhibit 10: Potential stress scenarios for CCPs

Daily percentage losses in equity markets



¹⁾ Based on Dow Jones Industrial Average
Source: Bloomberg

³⁷⁾ See Coeuré, B. 2014

shows two default scenarios³⁸⁾ combined with an assumed equity market drop of about 30 per cent. As described in chapter 2, the lines of defence consist of margins of the defaulted clearing member, the CCP’s own dedicated resources and default fund contributions of all clearing members, including the option to require replenishments of the default fund from all non-defaulting clearing members, to a level typical across CCPs.

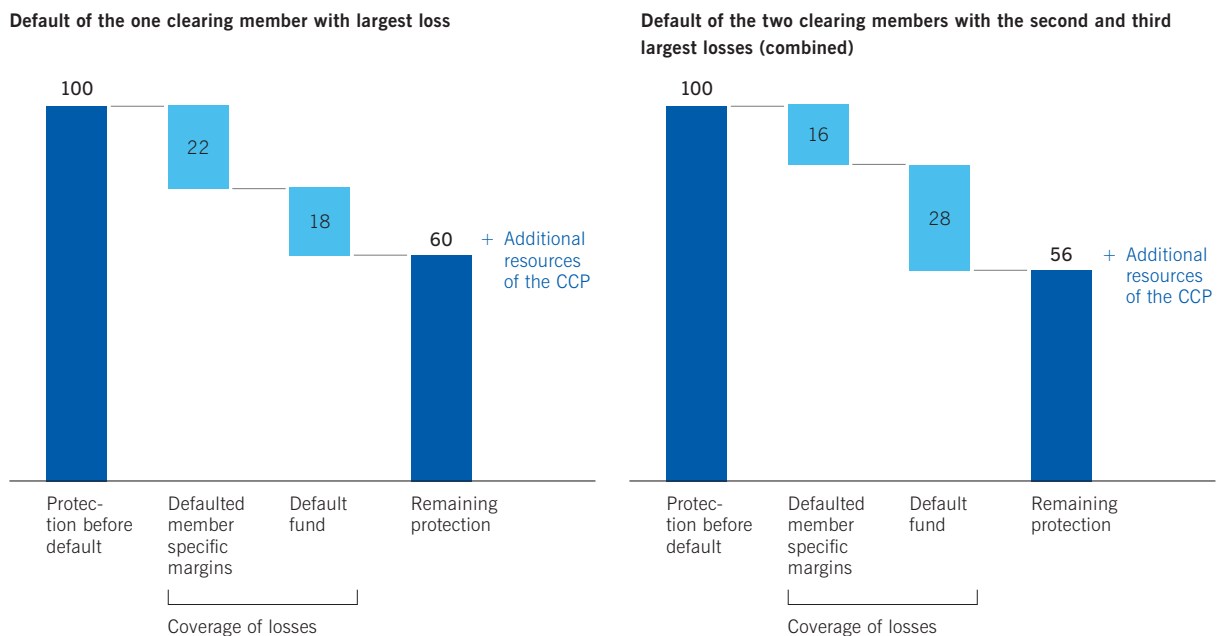
The left-hand chart of Exhibit 11 shows the losses arising from the clearing member whose default would cause the largest loss in excess of its posted margins. In this severe stress scenario, about 60 per cent of the CCP’s total protection remains

available. The right-hand chart shows the combined losses from the clearing members whose default would cause the second and third largest losses in excess of their posted margins. In this situation, about 56 per cent of the CCP’s protection remains intact.³⁹⁾

Moreover, a CCP usually engages in hedging and other loss-minimising measures as part of its default management process. This analysis does not reflect such active measures.⁴⁰⁾ So, even without considering these active measures, the analysis indicates that a CCP with prudent lines of defence is prepared to withstand severe defaults of multiple clearing members, thereby not only ensuring its own safety, but also the safety of its clearing members.

Exhibit 11: Extreme stress case: CCP’s lines of defence withstand an equity market drop of 30 per cent

Utilisation rate of an EMIR compliant CCP’s lines of defence based on two default scenarios (values indexed to amount of protection before default)



Source: Eurex Clearing, own calculation

38) EMIR requires the default fund „to withstand, under extreme but plausible market conditions, the default of the clearing member to which it has the largest exposures or of the second and third largest clearing members, if the sum of their exposures is larger“ (see article 42), and, together with the resources of CCPs, the default fund needs to withstand the losses of the two largest exposures combined (see article 43).

39) These scenarios are similar to stress tests as required by EMIR.

40) Viewed over four consecutive days, equity markets have experienced larger drops than the one depicted in Exhibit 11. The market decreased by 17 per cent in 2008, 25 per cent in 1929 and 31 per cent around Black Monday in 1987. The 30 per cent drop is therefore in line with the maximum losses observed over a four-day period, which is roughly the time period in which all open positions are closed. However, many positions will be closed or hedged right after the default.

3.3 Strengthening market structure in cleared markets

While the existing laws and regulations have primarily addressed the micro-prudential safety of CCPs, going forward the macro-prudential side will grow in importance. The move to broaden the use of central clearing was chosen because of its beneficial macro-prudential aspects. It enables the distinction of risk taker and risk manager, separates their incentive structures and creates a mechanism to address the mutual value and interest of the market participants.

As described in Chapter 2, a CCP externalises and concentrates the counterparty credit risk management between its members for the markets it clears. The key benefits that central clearing brings in terms of settlement and process efficiency or risk management are higher when a larger share of the market operates through a small number of CCPs. The degree to which these benefits vary depends on the asset class, for instance cash equity markets tend to focus on the operational efficiency aspect given the short settlement periods, whereas derivatives markets CCPs' key feature is risk management in terms of margining and Lines of Defence.

This chapter reviews the critical determinants of a crisis resilient market structure in centrally cleared markets considering the role of intermediaries and CCPs.

Role of intermediaries

One type of concentration that must be considered in centrally cleared markets is in terms of its membership, who may have both proprietary and client business at CCPs. For those with client business, the role of the intermediary, typically a bank, has the benefit of bringing a diverse group of clients to the market and shielding the CCP from client defaults.⁴¹⁾ Intermediaries play an important function in this respect as they transform diverse credit risks from a wide array of clients to the lower credit risk of the bank towards

the CCP with its own risk management safeguards. However, it is in the interest of the CCP, its members in general, and their clients to avoid overly concentration on a limited number of intermediaries. This is both for the stability of the intermediaries themselves, and to limit the impact on large client groups should their Clearing Member default. Therefore CCPs charge further margins to reflect the possible latent concentration they could face for cascades of defaults for such intermediaries. Another possible tool is to set limits on the overall size a member can have across the CCP.

Over time, centrally cleared markets benefit from less concentration amongst their members acting as intermediaries. A broad and diverse direct membership to a CCP is more robust given their heterogeneous business models. Thus regulators and policy makers should ensure that the intermediaries are able to establish sustainable and profitable business models and are able to perform their important function in the new regulatory environment.

Risk concentration in cleared markets

Central clearing includes by definition a concentration of functions into a CCP, and this is desirable from a risk, default and crisis management point of view, and has positive externalities for a market structure. Whereas concentration is undesirable in risk taking, it is altogether desirable for risk management.

The larger the share a CCP has of a market, the better their overview of the risk situation, the easier to charge commensurate margins, the greater the efficiency in terms of tail-risk management and sizing of the lines of defence and the larger are the multilateral netting benefits. Only central clearing and central risk management reduces the overall exposure and risk in the market to a maximum extent.

41) Clearing members are responsible for defaults of their clients, for which the CCP's lines of defence are not used.

In addition, many of the preeminent CCPs offer their services to multiple markets and asset classes, enabling additional economies of scale and scope. Such multi-asset CCPs benefit also from mutualisation of tail risks across their various markets, and have the additional positive feature that their members are all incentivised to ensure each segment is prudently managed.

However, while the CCP serves as a shock absorber between its members, a failure of the CCP itself will affect them all. To address this very unlikely but large impact event of a CCP's failure, several points need to be considered: the number of CCPs, the CCPs' internal ring-fencing of losses, the governance and transparency of CCPs and their recovery or resolution.

Multiple CCPs clearing a particular market limit the effect of a failure at any particular one to its share of the cleared market. Also, multiple CCPs satisfy the desire for choice from members and promote innovation in risk management. However, if the number of CCPs increases substantially, their beneficial features are degraded and the informational benefit and effective crisis management through them becomes limited. To address this balance, a minimum requirement of two CCPs to mandate central clearing is prudent, since it prevents a single point of failure. Hence a market-driven structure with more than one CCP capable of clearing a market albeit a small number avoiding fragmentation in the main time zones per asset class is optimal from a systemic risk perspective.

Within a multi-asset class CCP it is advisable to limit the spill-over of losses per market. Most CCPs have therefore adopted ring-fencing in their mutual lines of defense. A particularly critical point will be the relation of CCPs to each other through various links, as well as to other FMIs. Minimizing the contagion and interconnectedness of CCPs is also in the interest of the CCPs' members to ensure the CCP landscape is prudently organized.

Independence of CCPs minimizes moral hazard and must necessarily be coupled with a strong governance structure bringing all the CCPs' stakeholders together to reflect the mutualisation of tail-risks. For the benefits of CCP market structure to be realized, especially in terms of accounting for concentration in the participants or the members acting as intermediaries, as well as the CCPs themselves, transparency is a pre-requisite. To this end, the industry and authorities are currently working on CCP disclosure requirements.

To minimize the likelihood and impact of possible failures from such concentrated risk managers, ex ante incentives should failure arise, and the orderly ways for it to occur must be addressed. This topic is currently in active development in the primary jurisdictions in terms of recovery and resolution plans (RRPs) for CCPs.

A key distinction recovery and resolution plans must make is whether the problem was specific to a particular CCP, or whether it is a "market problem". If a particular CCP has failed, then the RRP must describe how losses are borne by the entity while the market can continue. If on the other hand the market has experienced a severe event surpassing previous levels of safety provided for, the CCP construction enables stakeholders to jointly address the problem by managing one central mechanism. Specifically, CCPs enable their participants and authorities to decide on whether, and what amount of, further funds should be contributed in proportion to activity in the markets to recover from a crisis. It also enables the participants to limit their exposure to the committed mutualized amounts, and should the disruption be severe enough to discourage continuing the service, to wind it down in an orderly way.

3.4 Recovery and resolution plans as last resort

A centrally cleared market structure has one salient point that needs to be addressed: the inter-linkage of a market and the CCPs that clear it. While the analysis above illustrates that a CCP can withstand market disruptions that are more severe than historical worst case scenarios, nevertheless, there might be unprecedented and unforeseen events that affect a CCP and its operations. CCPs, market participants and regulatory authorities should be prepared for this scenario, irrespective of its likelihood, by drafting recovery and resolutions plans (RRPs).

While certain recovery and resolution mechanisms are included in CCP rules today, in future all FMIs must have RRP in place to ensure appropriate actions should overwhelming circumstances arise. The value of RRP was proven during past defaults addressed in section 3.1. While HKFE was successfully recovered since it was a viable market, Caisse de Liquidation demonstrates the advantages of orderly wind-down for unviable markets.

Principles for recovery and resolution plans

Recovery and resolution plans should be reviewed in light of how well they serve their purpose. Therefore, the following key principles should be regarded (Exhibit 12).

RRPs are designed to achieve two objects: to enable and facilitate the recovery of troubled institutions and to permit an orderly wind-down if recovery is impossible or undesirable. These plans go beyond regular insolvency laws as they have the aim of fostering stability, maintaining service continuity, and minimising possible impact to other market participants from disruptions.⁴²⁾ Recovery is the assumed path, and the lines of defence of a CCP can be considered to be prefunded and have access to committed reserves to enable this. If their depletion is threatened, the CCP and its stakeholders will come to a decision on whether further recovery measures are desired or not.

Exhibit 12: Principles for recovery and resolution plans

- Support recovery of CCP if viable or facilitate resolution
- Ensure continuity of CCP's services to market participants
- Contain impact of disruption by ring-fencing
- Ensure loss allocation without need for public money
- Provide effective tools that allow flexibility
- Clearly define resolution authorities

Following this decision, two major questions need to be answered: First, how to ensure the continuity of service for the cleared products for market participants and second, how to deal with loss allocation, including the isolation of healthy markets from the unviable one, i.e., by ring-fencing the troubled asset classes if this is applicable.

To ensure that the recovery and resolution plans are comprehensive and effective, the loss allocation must be well defined. In particular, to prevent moral hazard and ensure a level playing field, the RRP must ensure that public funds are not relied on. This has further beneficial features in terms of transparency towards participants and ex ante risk management incentives.

To ensure the continuity of the CCP's services, the CCP landscape should encompass a market structure where every product can be cleared by at least two CCPs if it is subject to a clearing obligation. This type of market structure is important so that market participants have at least one alternative if a CCP gets into trouble. Recovery and resolution plans must also distinguish between CCP-specific problems, and marketwide problems, the former being typically a non-default loss.

Given that such RRP would only be utilised in situations wildly different than those assumed even in extreme tail cases, the plans should contain a variety of tools, and the flexibility to use them, as appropriate for whatever situation may be at hand. To this end, it is expected

42) See Draghi, M. 2013

that CCPs' RRP contain a menu of mechanisms for recovery and/or resolution that enable reacting as required to events.

To deliver desired outcomes in such cases, a specified resolution authority familiar with the CCP and preparations for the recovery and resolution plan should be in charge so that decision making is swift and appropriate.

Besides these overarching principles RRP should follow, there are different options for how stakeholders might be involved in recovery plans and different ways how resolution might work, which are discussed in the following.

Recovery plan

Recovery plans are already drawn up by many CCPs. They ensure that CCPs continue to operate orderly and recover from losses which exceed the pre-funded contributions of clearing members. They are the preferred option for viable markets and asset classes and include various options for recapitalisation and restructuring. The CCPs and regulating authorities need to make sure that any additional capital provision by stakeholders does not increase systemic risk, in particular by considering that non-defaulting clearing members already contributed to the replenishment of the default fund.⁴³⁾

Capital provision by shareholders and bondholders.

Equity injections are included as part of the loss allocation process prior to recovery and resolution. However, further capital injections in line with loss allocation may be needed. The obligation to inject more capital should fall to shareholders before debt holders must absorb further losses. CCPs also have fewer outstanding bonds, which reduces the room for bail-in by bondholders. Possible financing options for this route include asset sales, future dividends, levies, or loans taken on by the CCP.

Capital provision by non-defaulting clearing members.

In cases of recovery, non-defaulting clearing members could be approached for additional capital, as they have a central interest in the continuation of the CCP. CCPs currently have different rules for replenishing default funds. These CCP-specific rules need to be considered when creating standards for potential further involvement of clearing members. The extent to which clearing members are willing to contribute further capital serves as a check of the CCP's viability.

Capital provision by the clients of clearing members.

Alongside non-defaulting clearing members, a CCP or its direct members could involve their clients and end users in the recovery process, as they have an interest in the functioning of the markets. Clients are not directly linked to the CCP, but they benefit from the CCP. The participation of clients in loss allocation could significantly increase the funds available to cover remaining losses and hence the likelihood that orderly CCP operations continue. At the same time, involving clients increases complexity because there is no direct legal relationship between clients and the CCP, and any potentially affected participants must be involved in designing implementable rules.

Resolution plan

In cases of extreme stress, the CCP may not remain viable as a going concern. Losses may exceed the contractual limits stated in the CCP's rules, and there may be no appetite amongst stakeholders for continuing the CCP. Under such circumstances, a CCP with finite resources would ultimately default. Because such an event would affect the members of the CCP and the markets it serves, CCP resolution plans – like those for banks – ensure that a wind-down or transfer is orderly and equitable, and promotes financial stability.⁴⁴⁾ Resolution plans have to be credible in order to promote market discipline and incentivise

43) See ISDA/ IIF/ TCH 2013

44) See CPSS-IOSCO 2013

market-based solutions.⁴⁵⁾ Hence, a resolution plan should be a mandatory requirement for any FMI. Under such a plan, resolution authorities are responsible for ensuring an optimal outcome under the circumstances, as well as other possible actions, such as replacing the management.

Continuation of contracts by transfer. It is also possible to continue a CCP's operations without saving the CCP itself. This approach involves separating stable contracts from the open positions of defaulting members. The separation is feasible at the asset class level and could be achieved by transferring the stable contracts and functioning operations to a bridge institution. In general, the CCP in question could also be bought with all its infrastructure and operations intact, and continue to serve its clearing members with a new ownership structure.

Wind-down. If it is not possible for a different entity to continue a CCP's operations or the market is deemed unviable, a mechanism for the orderly settlement of contracts is needed. The last resort is a general tear-up, in which the contracts of the CCP are terminated and any future liabilities cease to exist. The resolution authority terminates all contracts at the same time and for the same settlement prices across all members. The resulting process is far simpler and cleaner than those involving bilateral contracts, which may be broken or

terminated at different times and prices. A multi-asset class CCP could also be wound down for only one dysfunctional segment and not the entire CCP, if this were desirable. Even though recovery and resolution plans are designed as a backstop for events that overwhelm the safety standards and lines of defence of CCPs, they have very beneficial effects *ex ante*. Stakeholders involved with the CCP have the incentive to thoroughly oversee the CCP's adherence to standards, as RRP might request the participation of stakeholders in the recovery or resolution. CCPs themselves have the incentive to act with integrity and enforce prudent risk management standards, as they face the possibility of resolution.

RRPs thus do not only mitigate systemic risk once it materialises, but reduce its likelihood *ex ante*⁴⁶⁾ and make systemic risks in combination with the market structure of CCPs manageable. Hence, the drafting and review of such plans is a very positive development given the role of CCPs in systemic risk management, in particular in their imminent broader use for OTC derivatives. Today, RRP development for CCPs and other FMIs is at different stages, depending on the jurisdiction. The European Commission is expected to bring forward a legislative proposal once CPSS-IOSCO has finalised their supplemental guidance for their Principles for Financial Market Infrastructures regarding recovery and resolution.

45) See FSB 2011

46) See European Commission 2012

4. Conclusion

In recent years, regulating authorities around the world have tackled the root causes of instability and systemic risk in financial markets. Introducing the clearing obligation for standardised OTC derivatives forms a pivotal element in the resulting regulatory regime. The annual net benefit of the reforms advocating central clearing is estimated to be around 0.12 per cent of global GDP.⁴⁷⁾ Former US President Bill Clinton recently stated that failure to reform OTC derivatives markets earlier, especially in regard to transparency and collateralisation, was a “real mistake”.⁴⁸⁾ However, regulators and policy makers have taken many actions since the financial crisis to improve the stability of financial markets, including the centrally and non-centrally cleared OTC derivatives markets.

This white paper lays out how systemic risk is mitigated in centrally compared to non-centrally cleared markets.

CCPs reduce systemic risk in three ways. First, a CCP as independent risk manager does not take on proprietary risk and reflects the risk exposure by neutral valuation and prudent collateralisation. Prudent levels of collateralisation in turn align market participants’ risk-related incentives up front, preventing excessive risk taking. Second, interconnectedness in the market is reduced by both the structure of centrally cleared markets, i.e. novation by the CCP, and by multilateral netting. Third, a CCP is better able to absorb shocks by its multiple lines of defence and its default management process. These advantages decrease the uncertainty in financial markets and thus mitigate domino effects and spill-overs to the whole market.

These advantages of CCPs lead to greater safety and integrity in the financial system. The explicit and transparent rule sets for losses in defaults create positive incentives to manage various concentration risks ex

ante. Systemic events become less likely and their impact can be mitigated more effectively. In other words, CCPs serve as shock absorbers for the market and act as systemic risk managers.⁴⁹⁾

To sustainably and effectively fulfil their role as systemic risk managers, it needs to be ensured that CCPs themselves are resilient. Therefore, CCPs need to comply with high standards regarding their governance and incentives, risk management, liquidity management, and operations, as for example EMIR sets out highest standards globally. CCPs might still face unprecedented and unforeseen events that overwhelm their quality standards and lines of defence. Even in such extreme scenarios, a CCP has advantages over an interconnected bilateral structure since it allows more effective central decision making on recovery and resolution tools under the supervision of a competent authority. To ensure that problems of a single CCP or dramatic market-wide shocks do not negatively affect the whole financial system, CCPs need to have recovery and resolution mechanisms in place as a last resort.

However, since the scenarios in which CCPs can fail are very rare, these plans should be flexible to allow the respective CCP and the resolution authority to adopt measures suited for each individual case.

Overall, CCPs reduce systemic risks substantially compared to non-centrally cleared markets. They effectively address major root causes of the financial crisis by preventing excessive risk taking, reducing interconnectedness, absorbing losses and related shocks in the financial system, and facilitating central decision making based on predefined rules. By mitigating systemic risk, CCPs prevent costs for the public comparable to the financial crisis.

47) See Macroeconomic Assessment Group on Derivatives 2013

48) See Risk.net – Rennison, J. 2013

49) See Bank of England – Rehlon, A./Nixon, D. 2013b; Bänziger, H. 2009

Glossary

Central clearing

An intermediary steps into the bilateral agreement of two counterparties and acts as buyer to seller and vice versa. The intermediary assumes the → clearing responsibility of the trading parties. The intermediaries which conduct central clearing are → CCP.

Central counterparty (CCP)

Legal entity that acts as an intermediary between the parties to a securities or derivatives trade and is the seller to every buyer and the buyer to every seller, replacing the default risk of the original counterparty with its own and facilitating → netting. Many CCPs also provide various other benefits, including post-trade anonymity, reporting and risk management tools to their members.

Clearing

In the case of derivatives, the management of open derivatives positions including their → netting. Termination of derivatives contracts is also part of derivatives clearing involving the establishment of final positions for → settlement. Mitigating the → counterparty risks on open derivatives positions is the most important aspect of derivatives clearing. As derivatives contracts can have long maturities, clearing plays a crucial role in the derivatives value chain and is considerably more complex than, for example, the clearing of cash equities.

Clearing member

→ Market participant holding a → clearing license at a → CCP.

Client of clearing member

Clients of → clearing members can access centrally cleared financial instruments via their clearing members.

Client asset segregation

A → CCP keeps separate records and accounts for the assets and positions of → clearing members' clients. In case of a → clearing member default, the clients' assets and positions are protected and can be transferred to another clearing member.

Collateralisation

The use of collateral to secure a transaction. In the derivatives market, collateralisation plays an important role to manage → counterparty risk.

Concentration risk

Potential to bear losses due to a large exposure with respect to only a few → market participants. The concentration risk for → CCPs or market participants is high if they interact with only a few market players.

Contagion

A shock, which only affects one or a few → market participants, spreads to entire market. For example, the default of a bank can lead to losses for other market participants which can initiate a chain of further defaults (see → systemic risk).

Counterparty risk

The risk that a counterparty to a contract defaults and cannot fulfil its contractual obligations.

Credit default swap (CDS)

A derivatives contract to transfer the → credit risk of underlying debt instruments (mostly bonds or loans). A CDS buyer receives credit protection. In the case of default, the buyer will be compensated by the CDS seller. In return for the credit protection, the seller receives periodic payments from the CDS buyer.

Default fund

One of the → lines of defence of a → CCP, also referred to as clearing or guarantee fund. The default fund is a communal pot of collateral provided by all → clearing members of the CCP to provide further loss coverage for extreme events. Default funds are an efficient way to provide substantial financial firepower to protect the CCP. Typically, default funds are collected from members based on their relative size in the markets of the CCP in question.

Financial market infrastructure (FMI)

Multilateral system among participating institutions, including the operator of the system, used for the purposes of clearing, settling, or recording payments, securities, derivatives, or other financial transactions.

Initial margin

Collateral (cash or pledged security) deposited by the → clearing member to cover the → risk exposure of the → CCP arising from potential future market fluctuation.

Interconnectedness

Degree to which → market participants are linked to each other.

Lines of defence

The multiple risk mitigation layers of a → CCP, often referred to as the CCP risk waterfall. The Lines of defence of CCPs are prudently scaled to meet severe stress scenarios and ensure confidence that CCPs can guarantee contracts.

Liquidity risk

Liquidity risk can mean either A) market or B) funding liquidity risk. A) Market liquidity risk materialises when financial assets cannot be sold rapidly at the presumed market value. B) Funding liquidity risk is the risk that a counterparty has insufficient funds to meet its financial obligations when they are due.

Loss mutualisation

The distribution of losses across the parties active in a market segment. CCP members agree to mutualise losses amongst themselves should the losses exceed the collateral provided by the defaulting member and the → CCPs own contributions. This is a stabilising factor equivalent to an insurance scheme since a large amount of security is available at a marginal cost to the affected non-defaulting members.

Market participant

In the context of this white paper, a market participant is a company which actively engages in financial market transactions, e.g. investors and banks.

Multilateral netting

→ Netting of three or more market participants' positions via → financial market infrastructures, e.g., → CCPs.

Netting

Offsetting buy and sell positions over a given period of time so that → market participants only have to settle the balance. If two parties agree to net their positions, this is called bilateral netting. → Central counterparties even allow the netting of three or more parties' positions, which is called multilateral netting.

Netting efficiency

Degree to which opposite positions or obligations are offset among trading partners to reduce → risk exposure, the required settlements or payments.

Non-central clearing

The clearing of the financial asset is not done via a central intermediary (see → CCP).

Operational risk

Temporary or permanent disruption of a → market participant's or a → CCP's operations. Central aspects of the → CCP's operations are its IT infrastructure, facilities and workforce.

Recovery plan

A plan that aims to recover the existing entity in case it faces imminent default. Recovery plans describe various ways of raising new resources and maintaining service continuity.

Resolution plan

A resolution plan describes ex ante how an entity can be wound down in an orderly fashion to minimise any disruptions that could result from an uncontrolled insolvency. The resolution plan kicks in if recovery is not viable.

Risk exposure

Potential maximum loss. In derivatives transactions, risk exposure can be broken down into two components: A) the current market value of the derivative, i.e. the amount that a counterparty would lose if the other counterparty defaulted today, and B) an add-on for potential future exposure to capture the risk of market value fluctuation.

Settlement

In the case of derivatives, the sole payment of cash to fulfil the obligation arising from a derivatives contract (cash settlement) or the payment of cash for an underlying and the delivery of the underlying in return (physical delivery).

Systemic event

Event during which → systemic risk materialises. This event can destabilise the market as a whole.

Systemic risk

The risk that the failure of one → market participant has adverse effects on other market participants, destabilising the market as a whole.

Variation margin

Cash paid or received by the holder of derivatives to cover the current exposure. This is typically exchanged on a daily basis, to prevent losses from accumulating and is a form of mark-to-market. CCPs charge collateral intraday to their members to ensure any due variation margin can be covered.

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List of abbreviations

AIG	American International Group	HKFE	Hong Kong Futures Exchange
BIS	Bank of International Settlement	IMF	International Monetary Fund
BCBS	Basel Committee on Banking Supervision	IOSCO	International Organisation of Securities Commissions
CCP	Central counterparty	IRS	Interest rate swap
CDS	Credit default swap	ISDA	International Swaps and Derivatives Association
CME	Chicago Mercantile Exchange	MiFID	Markets in Financial Instruments Directive
CPSS	Committee on Payment and Settlement Systems	MiFIR	Markets in Financial Instruments Regulation
CRD IV	Capital Requirements Directive IV	OTC	Over-the-counter
EMIR	European Market Infrastructure Regulation	RRP	Recovery and resolution plan
ESMA	European Securities and Markets Authority		
FSB	Financial Stability Board		
FMI	Financial market infrastructure		
G20	Group consisting of 20 of the world's largest economies		

Published by

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60485 Frankfurt/Main
Germany

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July 2014
Order number hardcopy 9210-4509

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