

# Are we building the foundations for the next crisis already? The case of central clearing

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## Abstract

*Counterparty risk has been at the heart of the recent crisis driven by the toxicity of over-the-counter (OTC) derivatives and failure of high profile financial institutions. This has led policymakers to propose laws that would require most standard OTC derivatives to be centrally cleared. Central clearing involves a central counterparty (CCP) intermediating a transaction and acting as an insurer of counterparty risk. This has advantages, potentially leading to enhanced transparency and liquidity in markets and smoothing major systemic problems. The idea is also popular since it represents a single and intuitively simple solution to the severe problem of counterparty risk. However, whilst CCPs may have a role to play in reducing counterparty risk, they can also be counterproductive to the stability of financial markets. In this paper, we argue that the introduction of CCPs should be carefully considered and that, far from reducing counterparty risk, they may actually allow it to breed and contribute to the next crisis.*

## 1. Introduction

Counterparty credit risk has played a pivotal role in the credit crisis due to the insolvency of large prestigious financial institutions such as AIG, Bear Sterns, Lehman Brothers, Fannie Mae and Freddie Mac. The size of over-the-counter (OTC) derivatives markets means that counterparty risk is a key concern for financial institutions and many corporate users of derivatives. OTC derivatives are widely seen as having the natural ability to create systemic risk. Due to the increased focus on counterparty risk in OTC derivatives, especially credit derivatives, there has been a significant interest in central clearing. A central counterparty (CCP) is an entity that stands between parties with respect to some or all contracts traded between them. Because a CCP intervenes between buyers and sellers, it bears no net market risk but does take the counterparty risk. An institution trading through a CCP no longer needs to worry about the credit quality of its counterparty. Effectively, the CCP is the counterparty to all trades.

A CCP may reduce systemic episodes that were so highlighted within the financial markets during the 2007-2009 period. If an institution becomes insolvent then the

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CCP will guarantee all the contracts of that counterparty executed through them. This will mitigate concerns faced by institutions and may prevent any extreme actions that could worsen the situation, behaviour characterising the domino effect that is so associated with a severe systemic risk episode. The CCP will have initial margin and reserves to absorb losses due to the insolvency of a member. It may also require that excess losses caused by the failure of one or more counterparties be at least partially shared amongst all members of the CCP.

Whilst the presence of one or more CCPs might seem like a “silver bullet” with respect to counterparty risk, it is not all good news. A CCP must have a fine tuned structure with respect to margining, settlement and risk management and ultimately should be extremely unlikely to fail. The bigger a CCP becomes, the more catastrophic its failure would be. Furthermore, the homogenisation of counterparty risk and removal of the need for institutions to assess their counterparty’s credit quality may cause problems. The aim of this article is to discuss the strengths and weaknesses of CCPs and assess their viability in reducing counterparty risk.

## **2. The drive towards central clearing**

The housing crisis, credit crunch and financial and economic downturns during 2007-2009 led policymakers to propose laws that would require most standard OTC derivatives to be centrally cleared. This was largely driven by fears surrounding the credit default swap (CDS) market. A CDS is a derivative instrument whereby the credit quality of one or more underlying assets is traded. Due to their nature, CDS contracts can lead to large exposures being built up in rather small periods. The failure of American International Group (AIG) and some monoline insurers was linked to CDS contracts and so surely having all such contract derivatives cleared will be a big step forward in terms of limiting counterparty risk?

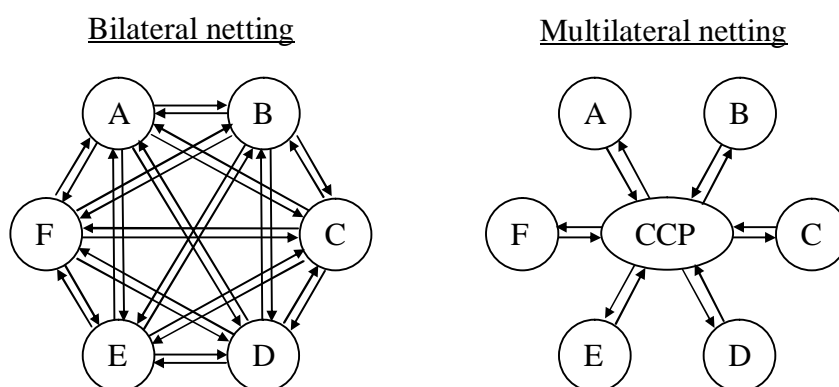
The above concerns must not be overstated due to the unprecedented nature of the credit crisis. The crisis was largely the result of systematic mispricing of mortgage related debt and not directly due to the growth of the credit derivatives market. The systemic failure of counterparty risk in CDS occurred only because of regulated financial guarantors, such as AIG, selling risky protection on assets such as Mortgage backed securities (MBS). AIG’s excessive risk taking via CDS was part of a broader problem related to seeking returns from mortgages and MBS without a proper understanding of the underlying risks.

It is well known that it is hard to get rid of financial risk and much easier to convert it into different forms. Hence, why would a CCP be the magic cure for counterparty risk? Would it not be rather in danger of converting it into some other, possibly more dangerous, form? We will argue that mandatory central clearing of OTC derivatives may not reduce counterparty risk and bilateral markets may be able to operate more efficiently on their own. Central clearing is not a quick fix to the current problems relating to counterparty risk and may even trigger or contribute to the next crisis.

### 3. How does a CCP work?

The two most common ways of reducing counterparty risk in OTC derivatives are netting and collateral. A CCP has the ability to increase the benefits of both mechanisms for market participants. A CCP essentially steps in-between parties to a transaction (see Figure 1) and therefore acts as an insurer of counterparty risk in both directions. However, as long as the CCP enters into two offsetting positions because of each novation, they are market neutral with no net market risk exposure. In order for a clearing entity to act in this way, it must heavily control its own exposure to counterparty risk through techniques such as daily margining and loss mutualisation. The counterparty risk taken by the CCP is substantial since if any counterparty defaults then they will be legally obliged to honour the exposures of other institutions had to that counterparty at the default time.

**Figure 1.** Illustration of the benefit of multilateral netting offered by central counterparties over standard bilateral netting in standard OTC derivatives markets.



As they guarantee the performance of contracts with respect to default of a member, the CCP must, for its own and other member's sakes, have a strong control over counterparty risk. A CCP manages its counterparty risk primarily by being able to rapidly close out trades in the event a counterparty ever becomes insolvent and having margin (collateral) to cover the associated losses. Initial margin is an independent upfront amount designed to provide a worse-case scenario buffer against the closing out of positions without loss to the CCP. Initial margin requirements need to be set carefully depending on the trade(s) in question. On the one hand, they should be competitive and recognise the benefit of diversification across trading positions but on the other hand, they must be large enough to absorb losses. Additionally, variation margin is used to cover the change in the value of trade(s) in the future and is passed regularly (at least daily) in both directions between the CCP and its counterparties.

With the possible exception of initial margin, all margin is likely to be required in cash due to the rapidly changing derivatives exposure and therefore the high velocity of value required through margin accounts. As a counterparty to all trades, CCPs will be calculation agents, valuing all positions and collecting or paying margin. A CCP may make intraday margin calls if large price movements threaten to exhaust margin funds in a member's account. Such practices are becomingly increasingly common and are supported by technology advances. End-users of OTC derivatives will expect to be exempted from posting margin since they do not typically post it in bilateral

transactions with dealers. The consequence of this is that they will probably only trade indirectly through a CCP.

Beyond a worst-case scenario, initial margin will not fully cover the losses that a failing counterparty has exposed a CCP to and excess losses need to be covered. Such losses can be absorbed by reserves, profits and equity of the CCP but ultimately may derive largely from additional contributions from members. This loss mutualisation is a key point since it spreads losses from the failure of a single counterparty across all other clearing members in a predefined manner. This has the potential to ameliorate any systemic problems arising in bilateral markets when an institution is heavily exposed to an insolvent counterparty. In a very bad scenario where one or more members is insolvent, other CCP members may effectively be required to contribute to a bail-out. They therefore retain some implicit indirect exposure to all other counterparts of the CCP, the magnitude of which is difficult to quantify (but hopefully small).

#### **4. Advantages of central clearing**

A CCP has many advantages, potentially leading to enhanced transparency and liquidity in markets and smoothing major systemic problems. The various advantages to market participants are outlined below.

- **Multilateral netting.** Contracts traded between different counterparties but traded through a CCP can be netted. This increases the flexibility to enter new transactions and terminate existing ones and reduces margin costs. In bilateral markets, closeout (cancellation) of transactions is problematic since only by trading with the original counterparty is it possible to neutralise the counterparty risk as well as the market risk component. Trading out of positions through a CCP is easy and, unlike bilateral markets, can be done with any other counterparty thanks to the multilateral netting benefit.
- **Loss mutualisation.** Even when a default creates losses exceeding the financial resources within the CCP, these losses may be distributed throughout the CCP members, reducing their impact on any one member. Thus, one counterparty's losses are dispersed partially throughout the market, making their impact less dramatic and reducing the possibility of systemic problems.
- **Transparency.** Derivatives traded through a CCP need to be priced on a regular basis due to daily margining and cash flow payments leading to a more transparent valuation of products. Furthermore, they will allow the trading positions held by each participant to be more transparent.
- **Capital reduction.** The distinction between bilateral and CCP cleared OTC transactions is recognised and may give rise to a zero capital weighing for trades with a CCP (see BIS [2009]).
- **Legal and operational efficiency.** Whilst not the primary purpose of a CCP, their operation means that they need to offer services related to the trading of derivatives. The margining, netting and settlement functions undertaken will increase operational efficiency and reduce costs. CCPs may also reduce legal risks in providing a centralisation of rules and mechanisms. A CCP working with regulators on the best procedures is more efficient than individual market participants taking this collective responsibility.

- **Liquidity.** A CCP will improve market liquidity through the ability of market participants to trade easily and benefit from multilateral netting. Market entry is enhanced through the ability to trade anonymously and the mitigation of counterparty risk. Firms with a lower credit quality, that would be unable to enter a bilateral market, may be able to enter the CCP based market.

CCPs may reduce the probability of failure of individual members through good handling of aspects of counterparty risk such as netting and margining and by enhancing liquidity. The reduction in counterparty risk for an institution may be realised in many ways such as the ability to enter into trades that were not practical before, smaller required reserves, lower hedging costs, more favourable capital charges or reduced balance sheet usage.

## **5. Disadvantages of central clearing**

The advantages of CCPs are clear and easy to explain. Disadvantages may not be as obvious and are harder to expose. However, this is not to say that advantages of CCPs clearly outweigh any disadvantages. Indeed, CCP benefits are double-edged swords leading to both favourable and unfavourable consequences. We will now describe some of the less favourable consequences of a CCP dominated OTC derivatives market and argue that the introduction of CCPs is by far an obvious strategy for reducing counterparty risk and avoiding financial crises.

### *i) Standardisation of products*

OTC derivatives tend to be customized and relatively illiquid, which limits the ability to clear them through a CCP. A certain amount of standardisation, for example of valuation approaches and documentation, is required before a product can be centrally cleared. Even small changes to contracts, such as adjusting maturity dates will cause difficulty. The ability to trade such contracts with minor variations is often considered very useful, for example, to enable corporates to perfectly hedge risks and/or qualify for hedge accounting.

Trading of exotic products and highly structured deals will be highly problematic due to their relatively large margins, illiquidity and complex valuation. However, the largest losses suffered by financial institutions tend to arise from positions in the more complex derivatives products. Hull [2010] argues that regulators should require all OTC derivatives to be subject to central clearing. This view is driven by the knowledge that it is precisely the more complex products that are likely to lead to dangerous losses for financial institutions. However, to achieve total product coverage under central clearing requires either a massive advance in product handling capabilities from CCPs or a severe restriction in the innovation that is allowed in derivatives markets.

### *ii) Increase in exposure*

It may be natural to assume that in going from a bilaterally to a multilaterally netted market, risk reduction through minimising exposure is guaranteed. However, when only a portion of OTC derivatives is centrally cleared, this is far from obvious since their bilateral netting benefit is lost. Suppose all OTC derivatives of type X are centrally cleared. Dealers gain from multilateral netting of derivatives of type X but each lose their own bilateral benefit of the netting of type X derivatives with all other derivatives they trade.

A simple and intuitive quantitative treatment of the netting benefits of a CCP is given by Duffie and Zhu [2009]. Their results are based on considering the exposure benefit for trading a single class of contracts through a CCP as opposed to bilaterally. For example, they show using a simple model<sup>2</sup> the critical number of dealers trading through the CCP for a single asset class to achieve netting reduction. It is perhaps worrying that, even without consideration of more subjective disadvantages of a CCP, there are clear cases where a CCP could simply be counterproductive by increasing the total exposure in the market. These results indicate either that a large proportion of OTC derivatives must be cleared by a relatively small number of CCPs or that there must be netting between CCPs. Neither of these points is trivial to achieve.

### *iii) Legal and operational integrity.*

A breakdown of any aspect of a CCPs infrastructure would be catastrophic since it would affect a relatively large number of parties within the market and operational procedures must therefore be carefully implemented. The setting of margin requirements and structure of other risk mitigation methods is a critical component of CCP design. The integrity of the legality of netting is critical for a CCP. Risk could arise if a netting agreement is not protected by national law in all relevant regions and jurisdictions. Additionally, like all market participants, CCP are exposed to operational risk such as systems failures and fraud.

The failure to meet a margin call will result in a clearing member being declared in default and its positions being closed out. There will be a grace period before this occurs but this will be short since the quicker the closeout can be done, the smaller the risk for the CCP and its other members. It is often argued that a CCP is in a good position to manage the risks of a member that becomes financially distressed. Whilst, it may require the tightening of risk mitigation such as margining it can also aid in the orderly unwinding of positions, without negative information leaking into the market and moving those positions against the distressed institution. The neutrality and ability of a CCP to disperse losses may mitigate information asymmetry that can propagate stress events in bilateral markets. When a dealer is perceived to be in difficulty in a bilateral market, other dealers may stop posting collateral and trading with that dealer catalysing their. This was the case with Bear Sterns in 2008.

However, the idea that a CCP will perhaps ignore scurrilous rumours and thus create stability is a dangerous one, as it seems to go against the idea of the efficient markets

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<sup>2</sup> Simplifying assumptions of symmetry and equal variance of exposure are used in this case.

hypothesis and stability. Market observables, such as widening CDS spreads may be symptoms rather than causes. A CCP ignoring rumours may create worse problems later when the rumours are proven. In the event that a CCP has effectively to ask members to cover losses that exceed initial margin and other resources, the members will presumably be surprised since they originally viewed the CCP as a risk-free counterparty and now have to subsidise other member's losses. Any possible deviation of the CCP from rigorous practice leading up to this event might give rise to legal challenges by a counterparty effectively required to bailout the CCP, especially if their own exposure to the failed member is small.

#### *iv) Monopolistic and profit issues*

Initial margin is a critical component in determining the creditworthiness of a CCP. It is a deposit intended to cover a large intraday price move against the institution in question with reference to the replacement cost of the trade(s). It should cover all but the extreme daily price movements with a confidence level of around 95-99% confidence being common. When setting initial margin requirements, a CCP must attempt to be competitive by keeping margins reasonable low. However, initial margins define the credit worthiness of the CCP, i.e. to what extent the default of a member can be absorbed without requiring losses to be passed on to other participants.

On the one hand, the market is best supported by a single CCP, since this maximises cross-product netting and margining efficiencies. The ideal of a single CCP must be balanced against monopoly concerns and cross-border issues due to regulatory and operational differences. The financial markets would be probably best served via a reasonable number of CCPs, large enough to offer good product coverage but not so large that their failure could trigger a global financial crisis. However, CCPs will naturally compete and regulation may favour a certain CCP, which may lead to suboptimal outcomes and market instability.

CCPs will need to develop ever-more sophisticated portfolio models to capture possible losses arising from a diverse and complex set of positions across different markets. CCPs clearing different markets must have techniques to provide an aggregate assessment of the overall risk of open positions. Margin requirements are a difficult area since a CCP should always aim to cover all but the extreme price movements but without being so conservative as to damage market liquidity and/or discourage the use of the CCP<sup>3</sup>. A CCP will inevitably be under constant pressure from its counterparties to be more competitive in the terms provided. When several CCPs are effectively competing then margin requirements will be a key distinguishing feature. To maintain profitability and satisfy shareholders then there is a danger that margins will be driven ever tighter, leading to an increased likelihood of members suffering losses and a CCP ultimately failing.

It will be very hard to ensure that, especially in buoyant markets; CCPs do not become more competitive and therefore increase the likelihood of failing during

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<sup>3</sup> High margins have been shown empirically to have a detrimental impact on trading volumes (for example see Hartzmark [1986] and Hardouvelis and Kim [1995]).

volatile markets and crashes. CCPs will give more benefit (reduced initial margins) for positions that are less correlated. However, it is well known that correlations increase in a crisis, often with variables with no obvious economic relationship becoming highly related. Just as banks VAR models have been shown to underestimate actual losses, a CCP may become over-confident with their approach for initial margin and be ultimately under-charging. From the point of view of an institution, if a CCP's margin requirements are too large then they *cannot* trade with them whereas if they are too small then they *should* not trade with them.

#### **v) *Homogenisation and moral hazards***

The homogenising of counterparty risk via mechanisms such as mutualised loss sharing arguably reduces systemic risk. If a major derivatives player defaults, it may not be clear how big the associated counterparty risk losses will be, nor which other institutions may bear the brunt of them. This uncertainty is mitigated through a CCP allocating losses across all of its members. However, in a centrally cleared market, all parties within a single CCP are equal<sup>4</sup> and the CCP acts as guarantor for all obligations. The CCP reduces the incentive to worry about credit quality. Rating agencies reduced the incentive for many market participants to monitor credit quality and their performance through the credit crisis was indifferent at best.

Risk homogenisation is thought to avoid domino effects but is simply not a good thing as it weakens market discipline. An institution with better than average risk management (credit quality assessment, collateral management, hedging) will lose out by trading through a CCP. Indeed, a CCP takes away the incentive for an institution to monitor closely its key counterparties and take action if their credit quality deteriorates. In a bilateral market, institutions with a relatively poor credit quality will experience higher costs and obstacles to trading which creates the correct incentives. However, when trading through a CCP, as long as a member is posting the relevant margin, the issue of their declining credit quality may be ignored (up to a point). This may allow poor quality institutions to build up bigger positions than they would normally be able to do in bilateral markets. Certain CCPs may be more popular with counterparties with below average risk management abilities and firms with weaker credit quality who can only achieve a limited amount of bilateral trading.

Pirrong [2009] argues that asymmetric information costs will be higher in centrally cleared markets compared to bilateral ones. This is explained to be due to the specialisation of dealers with respect to valuing exotic derivatives together and the fact that dealers are more effective at and have more incentive for good monitoring and pricing of counterparty risk compared to a CCP. Market participants trading with a CCP may be incentivised to create larger positions than they would otherwise like to or even be able to and a CCP may suffer from a winners curse. Such a phenomenon is well known in insurance markets where an insurer will naturally end up with more risk due to policyholders automatically finding the cheapest premiums given their circumstances.

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<sup>4</sup> With the caveat that a counterparty's liability to the CCP in the event of a default may be proportional to the overall size of their position.



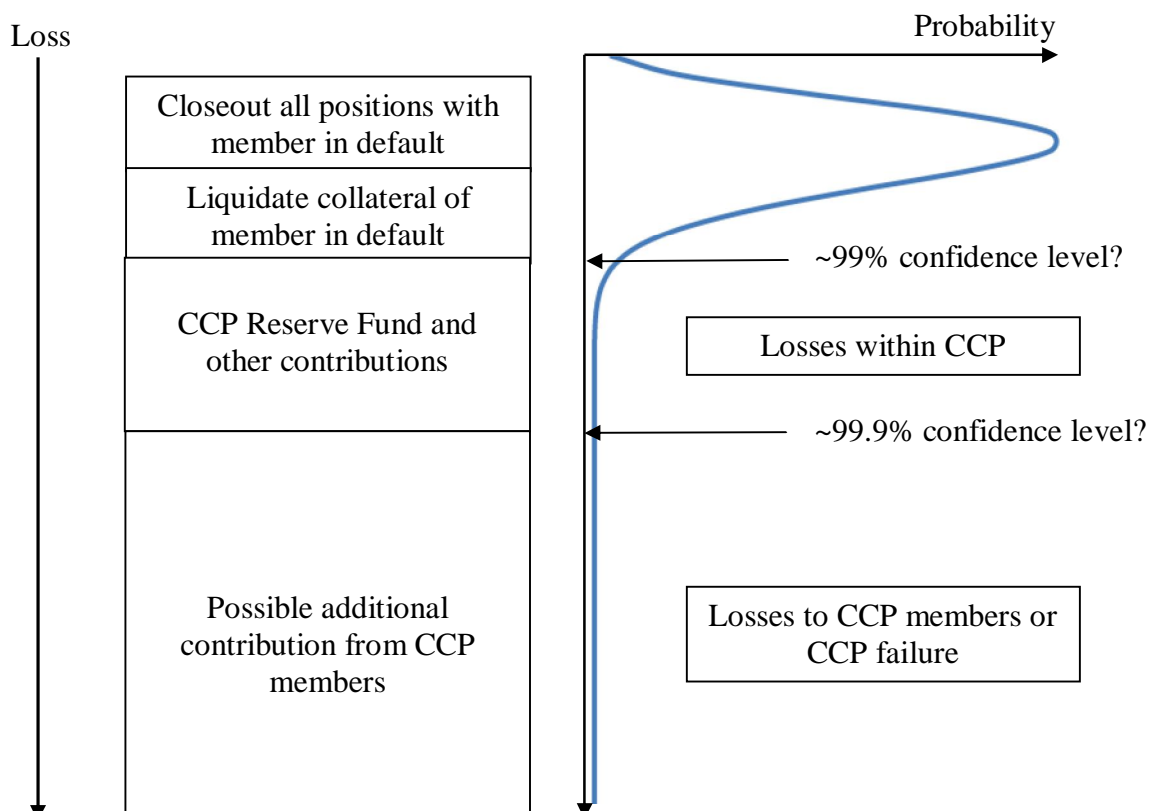
The products traded through the CCP may tend to be the more risky ones that an institution cannot manage easily in a bilateral market. There has been much recent interest to trade all CDS index products and single-name credit derivative products through CCPs, whereas over a long period prior to this, a much larger notional of interest rate swaps has been comfortably managed within a bilateral market. This could suggest that the products that market participants will most want and need to trade through a CCP will be the precise products that are most difficult to handle in this way. Shadab [2009] argues that a significant portion of CDS transactions will not be improved by centralised clearing and furthermore that this may increase CDS counterparty risk.

*vi) Too big to fail*

Although CCPs reduce counterparty risk for market participants, funnelling market activity through one institution leads to a concentration of risk. Since CCPs limit the risks to other market participants, their own potential failure becomes a critical component that would potentially lead to a systemic event. In the recent crisis, the interconnectedness of institutions such as AIG and Bear Sterns was a massive problem, reinforcing the concept of too big to fail financial institutions. Yet a CCP will be interconnected in the same way. The increasing reliance on central clearing just makes the impact of a future CCP failure more and more severe.

The viability of a CCP depends on its capability to withstand the default of one or more clearing members and it will therefore have several layers in order to absorb such losses. The actual mechanisms differ from one CCP to another but the general approach is illustrated in Figure 2.

**Figure 2.** Illustration of the waterfall of losses when one or more members of a CCP fails to meet payments (margin or other cashflows).



CCPs must focus on having margin requirements that cover losses in all but the most extreme cases. As discussed above, this represents a challenge for a CCP in balancing risk aversion against being competitive, increasing volumes and not losing market share to other CCPs. The calculation of initial margins is a VAR type problem in requiring the assessment of market risks in a window of 1-day with a confidence level in the region of 99%. This makes it a difficult task but one that is possible with the pragmatic use of quantitative and qualitative techniques.

Would a CCP have been quick enough to closeout and have sufficient margin posted against in an LTCM or AIG type insolvency? The discontinuities in derivatives values, especially in a crisis and products such as CDS with embedded jump-to-default risk would have made this a hapless task. Brady [1988] discusses the crash of 1987 and its impact on some clearinghouses arising in an extreme market event with associated liquidity problems. Bates and Craine [1999] showed that following the 1987 crash, the expected losses conditional on a margin call being breached increased by an order of magnitude.

CCPs and their counterparts must therefore also be concerned that there is adequate coverage of losses due to the default of a member following a margin depleting price move. Since the reserve fund is likely to be only moderate, then severe cases will lead to additional contributions from CCP members, other support or will cause failure of the CCP itself. In terms of confidence levels, we are now more in the realm of 99.9% or more and not 99%. The recent crisis has emphasised the futility in assessing probabilities of this magnitude (triple-A ratings of monolines or structured finance securities). Whilst a CCP may assess that the probability of large losses to be very small, experience has taught us that financial markets will always find ways of making large losses far more likely than any historical or model based analysis predicts.

The failure of a CCP would necessarily lead to at least a temporary breakdown of the market as the whole structure through which positions are established, maintained, and closed-out would be disrupted. Such a failure should be expected to be far worse than the failure of any single institution. Whilst, the *probability* of CCP failure might be smaller than that of an individual institution, it may represent a far more extreme and systemic event. The members of a CCP must face the fact that the possibility of having to one day effectively “bail-out” a defaulting member is a very real one. They may then come to the conclusion that it is preferable to have a controllable and direct exposure to a counterparty in a bilateral market than an uncontrollable, indirect exposure in a multilateral market.

### ***Conclusions***

Bilateral OTC markets have been extremely successful and their growth has been greater than that of exchange-traded products over the last 15 years. Whilst, it seems obvious that a bilaterally cleared market is vulnerable to systemic risk, this is not an argument for the naïve introduction of CCPs. A question as to whether CCPs really reduce counterparty risk should be more carefully considered. In bilateral markets, dealers compete for business based partially on their ability to manage counterparty risk. A CCP takes away the incentive to properly price and manage the counterparty

risk created when entering a trade. CCPs may provide transparency and have the air of stabilising markets in normal times but they have the capability to exacerbate problems in a crisis.

CCPs provide an institutional structure for managing counterparty risk that has proven successful in exchange-traded derivatives. Exchanges work well so why shouldn't a CCP? Exchanges developed from already mature, standardised and liquid markets as a means to make the markets even more efficient. CCPs are needed for immature, non-standard and illiquid markets as a sole means to attempt to control counterparty risk. There is very little to compare the historical development of exchanges and the current interest in CCPs.

Would a CCP have prevented AIG from accumulating \$85 billion of losses on complex securitizations of subprime mortgages? A CCP would either have prevented (or been prevented from) AIG trading through them due to the relative complexity of the underlying product and the fact that AIG would not post margin. Or, even worse, a CCP may have welcomed AIG with open arms due to their excellent credit quality and the then perceived rock-solid price stability of the triple-A structured finance products they were trading. Whilst credit derivatives are currently a key focus, the next crisis may be caused by a different class of OTC derivatives altogether.

CCPs may have a role to play in reducing counterparty risk but they can also be counterproductive to the stability of financial markets. The financial integrity of a central counterparty is critical, yet it can be compromised in so many ways, from poor margining to lack of diversification and asymmetric information problems. By mutualising counterparty risk, CCPs may provide a broad base for absorbing losses and may therefore minimise systemic risk and create better liquidity. However, this creates undisciplined markets as all the counterparty risk in the market becomes centralised and homogenised.

Clearinghouses are one of many solutions to the problem of counterparty risk management if they are run well. If not then they can become the centrepiece of the next crisis. A CCP would, of course, have its own highly advanced risk management capabilities and be subject to prudent supervision and capital requirements in order to make its failure highly unlikely. That's right, just like banking institutions before 2007.

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