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Redesigning OTC derivatives markets to ensure financial stability

CHRISTIAN NOYER

Governor

Banque de France

The turbulences experienced during the crisis on OTC derivatives markets have prompted regulators to find solutions to enhance the smooth functioning of these markets. It is crystal clear that in a context of inadequate underwriting practices in the US subprime mortgage markets and excessive granting of loans by non regulated entities, financial innovation based on credit derivatives was at the heart of the financial crisis. The years preceding the crisis were indeed marked by the creation and development of so-called structured financial products, which consist in constructing financial instruments using different «underlying» elements, including these subprime loans. The subprime crisis spread to some structured products as the latter were partly composed of them, and then to structured products across the board since there were doubts as to the actual composition of these products. The inflated use of securitisation led to the proliferation of these structured and very complex products (CDOs of ABS, CDO squared). It also contributed to the rise of a new business model for banks allowing them to switch from their traditional “originate and hold” role to a new “originate and distribute” function. Financial innovation and credit derivatives in particular thus contributed to bolster credit growth and the buildup of excessive credit risks as, in the process, credit providers somewhat lost skin in the game and the system as a whole built up significantly leveraged positions on what turned out to be low credit quality claims. In addition, the opacity of the markets reinforced the potential for excessive risk-taking and contagion effects across market participants: AIG and Lehman Brothers both in different domains illustrate the systemic risks embedded in an unrestrained use of derivatives.

Very large losses in the financial sector and the need for taxpayers' money to come to the rescue of institutions nearing bankruptcy was a stark reminder that this risk had progressively been overlooked or at least inappropriately accounted for and managed. A consensus among policy makers and beyond has therefore emerged to try and force a change in the OTC derivatives market to make it adopt as much as possible the technical features and infrastructures of organised markets. This is a very important challenge since derivatives transactions remain largely traded over the counter and exchange traded derivatives only account for 10% of transactions.

The consensus reached by the G20 leaders in Pittsburgh and reaffirmed recently in Toronto is therefore a very pressing issue and explains why the setting up of resilient OTC derivatives infrastructures is a widely shared key priority. Progress must indeed be made in two directions: increasing transparency and improving counterparty risk management.

The devil is in the details and the main challenge for regulators now lies in finalising the rules and incentives that will be conducive to reaching these targets. We need to find the right balance in order to give market participants enough incentives to better manage their risks without threatening financial innovation or reducing their incentives to hedge economic risks at a reasonable cost.

OTC derivatives are bilaterally traded contracts designed to isolate and transfer market or credit risk from one counterparty to another. Given that they are negotiated bilaterally, they are tailor-made and can precisely suit specific hedging needs.

As such, they serve important economic and risk management purposes. They also foster financial innovation and contribute to the completeness of financial markets.¹ Regulation should be designed in such a way that these economic and financial benefits are not undermined. However, loopholes in the design and infrastructure of these markets have led to misuse these instruments. We need to address these flaws in order to foster market efficiency and a level playing field.

The issue of opacity was clearly brought to the fore during the crisis. The very limited disclosure in these unregulated markets sometimes resulted in an overestimation of risks and fuelled market uncertainty, as counterparties had no information about each other's exposures.² To be fair, though, information regarding individual counterparties is generally not available either in organised markets but it is not a source of concern since these markets have developed structures to mitigate counterparty risks. This opacity led to an undifferentiated rise in counterparty risk perception across financial institutions following the default of Lehman Brothers. The lack of information also prevented regulators and market participants from realising that some counterparties had built up systemic exposures. The textbook example is the case of AIG in the credit default swap (CDS) market. More recently, concerns about the drivers of sovereign CDS spreads have given rise to suspicions of manipulation in this market segment, which is largely characterised by poor liquidity. Indeed, although sovereign CDSs are in strong demand as investors seek to hedge credit risk, liquidity and trading activity can sometimes be extremely low. One cannot deny that certain OTC derivatives (CDSs for instance) or certain types of transactions (short sales) are likely to exacerbate price movements or create instability that are detrimental to both issuers and investors. One may thus find it tempting to ban or drastically limit this type of operations and we indeed have observed national proposals going in that direction. It is critical to determine to what extent such concerns are grounded and whether there is a need

for "appropriate" measures.³ Such measures may not be efficient and, worse, may be counterproductive. They may not be efficient since security prices are not formed in national contexts but on global markets. What would not be possible in Paris or Frankfurt could still be allowed in London or New York for instance. They may also be counterproductive since they could deter activities away from our market onto others and they could significantly alter the liquidity of securities aimed by the restriction since foreign investors may shy away from them and turn to other opportunities.

Instead of banning and creating incentives to relocate certain activities elsewhere or circumvent those rules, it is preferable to attract and better supervise. This can be done:

- First, by integrating OTC markets into regulated and supervised market infrastructures such as trading platforms, trade repositories and CCPs. In the case of sovereign CDSs this will mean that all CDSs written on euro area sovereigns should be compensated in a CCP located in the euro area. Incidentally, that requires a fair amount of standardisation of these single name CDSs.
- Second, by enhancing transparency, both ex ante and ex post to improve our understanding of the price discovery mechanism and our knowledge of actual net positions of financial institutions.
- Finally, by improving risk management by agents active in these markets and ensuring that these practices are compatible with their risk profile. In fact we probably need a specific supervision of credit protection sellers.

INTEGRATING OTC MARKETS INTO REGULATED AND SUPERVISED MARKET INFRASTRUCTURES

We must devote our efforts to the thorough and swift implementation of the G20 commitments, which have enhanced and expanded the scope of regulation and oversight to OTC derivatives.

¹ See Das, *Credit Default Swaps – Financial Innovation or Financial Dysfunction*, in this issue; Tett, *Silos and Silences; why so few people spotted the problems in complex credit – and what that implies for the future*, in this issue.

² See Russo, *OTC derivatives: Financial stability challenges and responses from authorities*, in this issue.

³ See: Anderson, *Credit Default Swaps: What are the social benefits and costs?*, in this issue; Boone, Fransolet and Willeman, *Euro public debt and the markets: sovereign fundamentals and CDS market dynamics*, in this issue; Coudert and Gex, *Credit default swap and bond markets: which leads the other?*, in this issue; Duffie, *Is There a Case for Banning Short Speculation in Sovereign Bond Markets?*, in this issue.

All standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest.

Mandatory use of central counterparties (CCPs) for contracts that are sufficiently standardised and liquid could substantially reduce (although not eliminate) the systemic risk posed by OTC derivatives by diminishing counterparty and trade replacement risks. As the CCP interposes itself between both counterparts, the failure of any one of the clearing members does not directly affect other members, which still have their trade in place with the clearinghouse. This may actually decrease the risk of contagion in the event of a dealer failure. If properly implemented and risk managed, CCPs would limit excessive exposure by requiring protection sellers to post appropriate initial and variation margins. Eventually, the standardisation of contracts that would be required for them to be eligible to central clearing could enhance their liquidity while removing the risk of disputes linked to valuation discrepancies. However, counterparty risk never disappears. Clearing houses concentrate risks and should operate under appropriate oversight in order to ensure that they are properly capitalised, maintain robust risk management practices and meet high international standards of governance.⁴ CCPs must also not be dependent on liquidity provision by other financial intermediaries. In that respect, access to central bank liquidity is crucial. Indeed, given their systemic relevance, strong and reinforced supervision has never been so important. As reaffirmed by the Eurosystem's Governing Council,⁵ the infrastructure for clearing euro-denominated securities and derivatives should be located in the euro area. This is justified in order to ensure the effective exercise of the Eurosystem's core responsibilities with regard to monetary policy and financial stability.⁶ It is even more important in view of the role of the euro as a major currency of denomination of OTC derivatives contracts.⁷ At the international level, the Financial Stability Board, the Committee on Payment and Settlement Systems, the International Organization of Securities Commissions and the Basel Committee are working in close coordination to enhance risk management standards applicable to financial market infrastructures and define efficient prudential incentives to use sound CCPs.

The design of incentives to encourage market participants to clear on CCPs is critical. Regulators are facing the difficult task of finding a balanced approach so that collateral requirements are neither too tight, to make clearing attractive, nor too lax, to efficiently mitigate risks. As correctly highlighted in the review, CCPs are no panacea for all products and all markets. Not all instruments will be clearable as some will continue to be bilaterally settled because of their lack of liquidity or their bespoke features.⁸ As such, bilateral clearing should be seen as a necessary complement to centralised clearing.⁹ That is why it is also important that clear requirements be made to firms engaged in bilateral clearing to ensure that they apply sound risk management practices, including electronic confirmation of trades, portfolio reconciliation, daily margining and collateralisation. At the same time, bilateral clearing should be submitted to higher capital requirements.

Besides the coverage of instruments, the scope of participants subject to mandatory clearing is still to be defined. Non-financial corporations fiercely advocate that they be exempted from mandatory central clearing. Currently, most corporations are not required to post margins on a frequent basis. Their alleged lack of operational capabilities would not allow them to manage such a process on a daily basis and this would trigger additional liquidity needs that they cannot afford. Meeting these collateral calls would induce a freezing of resources detrimental to the financing of their industrial and commercial activity and lead to a decline in investment. It could also raise the cost of hedging to such an extent that it would dissuade them from hedging their risks properly. However, non-financial corporations' ability to intervene on financial markets widely differs from one corporation to another and we have to remain vigilant since some of them manage substantial trading activities. As such, a one-size-fits-all clearing requirement is certainly not appropriate for all corporations active in OTC markets; alternative approaches such as granting exemptions below certain thresholds are being explored and are acceptable as long as they do not result in the mere exemption of all non-financial corporations, as the crisis has demonstrated that OTC derivative positions taken by some of these players could have a significant impact on financial stability.

⁴ See Cont, *Credit Default Swaps and Financial Stability*, in this issue; Zigrand, *What do Network Theory and Endogenous Risk Theory have to say about the effects of CCPs on Systemic Stability?*, in this issue.

⁵ See the related Governing Council decisions of 19 December 2008 and 16 July 2009.

⁶ See Russo, *OTC derivatives: Financial stability challenges and responses from authorities*, in this issue.

⁷ See ECB, *OTC Derivatives and Post-Trading Infrastructures*, September 2009.

⁸ See Hull, *OTC Derivatives and Central Clearing: Can All Transactions Be Cleared?*, in this issue.

⁹ See Wellink, *Mitigating systemic risk in OTC derivatives markets*, in this issue.

ENHANCING TRANSPARENCY

All OTC derivative contracts should be reported to trade repositories to enhance the transparency on these markets. Better and more easily accessible data allows better risk management. To this end, mandatory reporting requirements should not be limited to cleared contracts and should provide information to both market participants and regulators. Obviously, the need for information differs very much between these types of actors. While only globalised information on trades and positions could be provided to market participants, regulators, including central banks as well as banking and market supervisors, should be granted an unfettered access to all the individual data they need in order to conduct effective macro and micro-surveillance, whatever the location of the trade repository.¹⁰

If we are to move these markets closer to organised markets, ex post transparency is not enough and greater ex ante information is definitely required for a number of asset classes. It is true that on-line services such as Bloomberg and Reuters disseminate dealer prices to the market but the degree of details, frequency and reliability differ a great deal between plain vanilla interest rate swaps or forex swaps for which almost continuous pricing can be easily observed and some CDS instruments for which, at best, one price is available for one typical day. The bespoke nature of certain transactions may explain the little appetite there may be for regularly disseminating prices but not all transactions have reached such a degree of customisation and clearly the industry must be spurred to rapidly reach comparable level of ex ante information. Greater pre-trade information will increase competition among market makers, thus contributing to pricing efficiency and reducing information asymmetry. This will foster market confidence and may lead to higher trading volumes and liquidity.

IMPROVING RISK MANAGEMENT

Risk management practices in OTC derivatives markets should also be tackled with great care. Although the

functioning of these markets has improved under the joint impulse of industry and regulators, many issues remain unsolved. Counterparty credit risk is a major weakness in the OTC derivatives market and a source of systemic risk. The practice of bilateral netting and collateralisation of derivatives payables and receivables for a given derivatives portfolio reduces direct counterparty losses by improving the recovery rate in case of a default. Nevertheless, consistency in risk management practices still needs to be enhanced and harmonised as highly rated counterparties and most corporations are not required to post margins by their counterparties.

Moreover collateralisation is not always sufficient to eliminate counterparty exposures, especially for CDS positions, because of a so-called jump-to-default phenomenon. When a CDS reference entity defaults abruptly, the one-off rise in spreads largely exceeds the margin provisions calculated on the basis of the previous market value of the contract, leaving the protection buyer highly exposed to the seller's counterparty risk.

Improving risk management by agents active in these markets and ensuring that these practices are compatible with their risk profile is also essential. In the case of CDSs, the issue is not necessarily with buyers who ultimately carry limited risks but with sellers. In fact we probably need a specific supervision of credit protection sellers and make sure that protection buyers have, indeed, in place commensurate risk management arrangements in place.

The G20 Pittsburgh statement sets a clear direction and deadline. Looking ahead, our challenge is now to specify the rules and implement them. These rules shall not solely aim at regulating instruments but also at changing market participants' behavior. This is decisive in establishing better risk management in derivatives markets. With both stronger market infrastructures and greater transparency, we will be in a good position to ensure that OTC derivatives provide a safer contribution to the financing of the economy.

¹⁰ See Jouyet, 21st century finance cannot do without a sound regulation of the OTC derivatives market, in this issue.

Credit default swaps: what are the social benefits and costs?

RONALD W. ANDERSON
London School of Economics

Credit default swaps (CDSs) are derivative contracts that allow agents to shift the risk of default on an underlying credit from a credit protection buyer to a credit protection seller. Like other derivatives they are standardised relative to the underlying cash markets and in this way can help promote market liquidity. This in turn can facilitate risk shifting and price discovery. In this way they may lead to accurate pricing of credit risk and ultimately to the reduced costs of borrowing. However, like other derivatives it is possible that CDS contracts could play a part in market manipulations, especially when the underlying cash market is not transparent. This is a potential cost of CDS trading that should be weighed against potential benefits of liquidity, risk shifting and price discovery. We discuss the balance of these trade-offs in the context of single-name corporate CDSs, index CDSs, sovereign CDSs and CDSs on structured credit product tranches. We also discuss other potential costs of CDS trading including that they “make selling short too cheap” and that they may create market instability by facilitating speculative attacks.

NB: r.w.anderson@lse.ac.uk.

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1 | VILLAIN OR SCAPEGOAT?

Since their introduction in the early 1990's the market for credit default swaps (CDSs) grew exponentially through 2007 after which it underwent a consolidation, declining by about 35% according to some measures of activity. The fact that the growth of this market and its subsequent decline seemed to coincide with the boom and then bust of the credit market generally has not gone unnoticed. On the contrary. There have been many strident voices arguing that CDSs have been part and parcel of the excesses on financial markets, that they contributed directly to the severity of the crisis, and that bringing CDSs under strict regulatory control or possibly banning them altogether is a necessary step to avoiding crises in the future.

The purpose of this paper is to discuss the development of default swaps within the broader literature on similar financial instruments and to assess their *social* benefits and costs. Our framework admits the possibility that benefits may exceed the cost as well as the possibility that they do not. We try to identify characteristics that could tip the balance either one way or the other. We then discuss those characteristics within the specific contexts of four major categories of CDS contracts – single name corporate CDS, index corporate CDS, sovereign CDS and CDS written on tranches of structured credit products. Finally we discuss whether the CDS market might serve a useful purpose as a very direct input into future macro prudential regulations.

2 | CDSs ARE DERIVATIVE CONTRACTS

While CDSs differ from futures, forwards and options in some respects they are nevertheless derivative contracts and share many of the same characteristics as those derivative contracts which have long been an integral part of our modern financial system. In particular, the potential social benefits of risk sharing and price discovery that a well-designed and well-functioning futures or option market can provide, apply as well to the CDSs. The

private costs of derivatives are the tangible costs of developing, operating and regulating a derivatives market that are reflected in direct and indirect (e.g., bid/ask spread) costs of transacting incurred by participants. More controversially, various social costs beyond these private costs have been ascribed to derivatives markets from time to time. These include possible manipulations or possibly discouraging real investment by increasing the volatility of the underlying cash market.

The CDS market is still relatively young and very little research has been done specifically assessing the costs and benefits in this market. In contrast, there is a large literature on the costs and benefits of futures and options. The public assessment of the balance of costs and benefits is implicitly reflected in the range of regulations that have been applied to these markets both through self-regulation by industry participants and by public authorities.

Since early days of the development of organised derivatives markets they have been viewed with suspicion. Nevertheless, they have proved to serve legitimate commercial purposes so that all but the most die-hard critics have recognised that they may be beneficial when used by qualified practitioners.¹ Defenders of derivatives markets point out that these markets serve the purposes of allowing risk shifting and price discovery. What are the *social benefits* of risk shifting and price discovery?² If derivative contracts allow an agent such as a producer to hedge the risk of cash market price fluctuations this may reduce the risk premium that the produce will apply in making investment decisions. This in turn will encourage production and will lower costs to consumers of the associated end products. Price discovery operates by giving an incentive to agents to become better forecasters of market conditions in the future and in this way will aid in allocating resources to the most valuable uses. For example, if in the future there will be an increase in demand that will lead to a price increase, then speculators who buy derivatives contracts now will bid up their prices in anticipation of that demand increase. Producers in turn will use these derivatives prices in making their production decisions and will increase their planned production in response to

¹ There is equally a clear consensus that derivatives contracts can be subject to abusive miss-selling. This is the basis for a number of legal protections which prevent their use by retail investors unless they demonstrate knowledge of the risks involved and the financial capacity to deal with those risks.

² For a fuller discussion, see, for example among many others, Anderson (R.W.) and Danthine (J.-P.) (1983).

higher derivatives prices. In this way production is guided to the markets where demand is greatest.

On the cost side, speaking broadly, there is widespread recognition that derivative contracts can give rise to market manipulations, especially when the market environment is not sufficiently transparent.³ Market squeezes occur when agents are able to exploit informational advantage on cash market by trading on the derivative market which because of anonymity will not fully reflect the underlying cash market conditions as seen by informed agents. Corners occur when agents with established derivative positions may have incentive to distort the price in the underlying cash market temporarily. A tendency to manipulations of either sort damages the integrity of the market and can undermine the benefits of the market used for legitimate purposes. This assessment has given rise to a number of rules and laws aimed at making manipulations less likely to occur and punishing perpetrators when they occur. In some markets problems generated by a very non-transparent cash market have meant that risk of manipulations leads to shutting down derivatives trading. Usually, the market dies of natural causes as market participants simply turn away from the derivatives, but occasionally public authorities have assisted in bringing about their demise.⁴

The view that derivatives contracts increase price volatility is closely related to the view that derivative contracts invite excessive speculation because of their relatively greater liquidity and high degree of leverage that can be achieved. Furthermore, derivatives are criticised from time to time because they facilitate short-selling. While there are many observers who have never wavered in their belief that derivatives cause instability there is no convincing evidence that this is generally the case. The academic literature on speculation has not given a definitive answer to the question of whether speculation stabilises or destabilises cash markets.⁵ Empirically there is very little convincing evidence that derivatives trading increases price volatility

as a general matter. It is true that volatility around contract settlement dates does seem to induce associated instability in cash markets. Furthermore, price changes on derivatives markets often seem to lead changes on spot markets. But this seems to be accounted for by the greater liquidity of derivatives. Finally, if the underlying cash market is an oligopoly, the introduction of derivatives trading might introduce greater competition and reduce price stickiness.⁶

It is significant that both the potential social benefits of derivatives and possibly their social costs depend largely on their liquidity. More liquid markets facilitate risk sharing and price discovery. But liquidity is an aid to speculation as well. If speculation is excessive, one might think that reducing liquidity would be a good thing.

The reason derivatives markets are often more liquid than the underlying cash markets is the fact that they are relatively standardised. If a contract design can be found that serves a wide range of users, then more agents will be on the market thus providing the important liquidity attributes of tightness (low bid/ask spreads), depth (ability to trade large quantities without having much price impact) and resilience (speed with which the market absorbs a large trade). In the case of exchange traded contracts, standardisation is achieved through the contract terms established by the exchange. In the case of over-the-counter (OTC) markets there are typically market standards established by professional organisations such as the International Swap Dealers Association (ISDA). For many derivatives users there is a trade-off between standardisation and having a closer link to the specific segment of the cash market where the participant is active. When the derivative is too distant from the agent's cash market then there will be a poor correlation between the derivative and cash market. The resulting "basis risk" will undermine the use of the derivative for hedging purposes.⁷ The difficulty of anticipating which contracts will attract a critical mass of participants means that exchanges regularly

³ For the pioneering analysis of derivatives manipulations based on asymmetric information see, Kyle (A.) (1984).

⁴ Curbing manipulations was the main regulatory intent of the Commodity Exchange Act 1936 which is still the foundation of derivatives regulation in the United States. See Anderson (R.W.) (1984).

⁵ Conditions under which speculation on futures markets can stabilise cash markets are given in Danthine (J.-P.) (1978). Conditions when the opposite holds are given in Guesnerie (R.) and Rochet (J.-C.) (1993).

⁶ Slade (M.) (1991).

⁷ For an analysis of this issue see, Duffie (D.) and Jackson (M.O.) (1989).

introduce new derivative contracts which ultimately fail. The greater flexibility of OTC contracts (as well as the development of electronic trading platforms) has been the basis of the boom of those markets relative to traditional exchange trade instruments since the mid-1990s.⁸

The other key feature of derivatives is the ability to achieve a high degree of leverage. This is a consequence of the fact that since derivatives contracts set out the price and other terms for transactions taking place in the future, they can be priced so as to require no initial transfer of cash between buyers and sellers. Subsequently, when underlying cash market prices and other conditions (such as volatility) change the value of the already established derivative contract will change leaving the buyer either with a gain or loss (and the seller with the compensating loss or gain). Thus in principle, the degree of risk that can be taken on in a derivative contract relative to initial outlay can be infinite. In practice, this is bounded by the amounts of security that are typically required (e.g., in the form of posted margins) in order to control counterparty risk, i.e., the risk that the party faced with an unrealised loss will default on contractual commitments. However, often the amounts of capital needed support a derivative trade will be relatively low either because the agent is considered a good credit risk or because margins are marked-to-market as prices evolve.

How do these observations about derivatives in general apply to CDS markets? The answer will depend to a great extent upon the nature of the underlying credit risk that is being exchanged in the swap contract. In our discussion we will focus on (a) single name corporate CDSs, (b) index products, (c) sovereign CDSs and (d) CDSs based on structured credit products. We start with single-name corporate CDSs because they are relatively simple contracts, are very widely used, and illustrate many of the basic characteristics shared with CDSs on other forms of credit.

3 | SINGLE NAME CORPORATE CDSs

The default swap market grew up in the 1990s in response to the need of banks and other lenders to hedge the risk that corporate clients might default on their loan or bond obligations. In the swap the credit protection buyer (say, bank A) pays the credit protection seller (say, hedge fund B) a periodic price of protection against default on a particular corporation (say, corporation C). The periodic payment is expressed as a contract coupon, called the spread, times the notional amount of the contract. If C defaults prior to the maturity of the swap, A delivers to B any note from a list of eligible notes issued by C, and in return B pays A par. Thus, upon default the credit protection buyer receives a net value equal to par minus the recovery value of the security. That is, it receives the loss given default (LGD).

This is a relatively simple security. Its cash flows strongly resemble those of an insurance policy taken out against the risk of default of corporation C. The spread times the notional amount is analogous to an insurance premium and the net value received by the protection buyer resembles the payment of an insurance claim. It is important however to recognise that the CDS is a derivative contract and not an insurance contract. In particular, unlike an insurance contract there is no obligation that the credit protection buyer has an "insured interest". This makes CDSs attractive to a wide variety of users who wish to exchange risks associated with a possible default of a particular corporation. It may be that the protection buyer already possesses a note that is deliverable on the contract and wants to lay off that risk. But it may be that the protection buyer is exposed to risk of default in another way and wants to lay off that risk, perhaps imperfectly, in buying a CDS. For example, the protection buyer may own a non-deliverable note on the same name. Or it may be a bank with a loan outstanding to that name. Or it may have guaranteed loans. Or it may

⁸ See, Anderson (R.W.) and McKay (K.) (2008).

be long shares in the underlying company. Or it may own the obligations issued by a subsidiary of the underlying name. Normally, any of these agents would stand to lose money in the event of default of the underlying name. They may find buying CDS protection is a relatively cost effective way to hedge their risk even if the protection obtained is not perfect. They may be willing to take on basis risk in return for gaining the advantages of CDS contract. As with other derivatives, those advantages are liquidity and competition among sellers, both of which contribute to making CDS markets relatively cheap.

The fact that CDSs on corporate debt could be attractive to a variety of agents formed the basis of the development of a liquid market. However, at its inception CDS trading developed as an OTC contract that was a relatively natural outgrowth of existing swap contracts. The main innovation was to make the exchange of notes at par contingent on a "credit event." It took some time to settle on an acceptable definition of what constituted a credit event. The market only took off when standards for this and other CDS terms were agreed among market participants. These standards were codified in the 2003 ISDA Credit Derivatives Definitions which established credit events as (a) bankruptcy, (b) failure to pay on one or more obligations following any applicable grace period, (c) restructuring of any of a number of contract terms (e.g., reduction of interest or principal, postponement of payment, contractual subordination), (d) moratorium, and (e) payment acceleration on obligations due to violation of restrictive covenants. Once genuine liquidity arrived on the market between 2001 and 2003, CDS contracts transformed the practice of credit risk management profoundly. The number of names for which it was possible to obtain firm dealer quotes to buy or sell CDS contracts with 1, 3 and 5 years maturity grew enormously. This made it feasible to employ dynamic hedging strategies. Also, the quoted CDS spread became the standard pricing reference. This was used in monitoring credit risk exposures and in loan pricing. Arguably, the decline in the credit spreads through the end of 2006 at least partially reflected structural benefits from the development of a more liquid, competitive market for credit.

It is worth emphasising that, by their nature, single name corporate CDS contracts are based on a relatively transparent underlying market. Companies

issuing traded notes are almost always listed corporations required to file audited financial reports and to meet listing standards. Often they are followed by security analysts. Typically, they are covered by rating agencies as well. Furthermore, agents with privileged information are prevented from exploiting this advantage by insider trading laws.

All of these factors tend to reduce the chance of market manipulations. However, early experience with CDS contracts following credit events showed that the standard physical delivery settlement procedure could give rise to short squeezes. This arose because of the often fragmented, illiquid nature of the underlying cash market for notes and bonds. In particular, in case of default a credit protection buyer who did not already possess a deliverable note would need to buy one on the cash market. If few such notes were available for sale because most were in the hands of long-term investors, then the price could easily rise thus eliminating much of the effective credit protection that had been sought in buying the CDSs. As in other physical delivery derivatives contracts a partial remedy to this problem was to increase the deliverable supply by expanding the list of acceptable notes. Again as in the case of other physical delivery derivative contracts, this created a delivery option in this case accruing to the credit protection buyer. Uncertainty about which security would be cheapest to deliver in case of default created an added difficulty in valuation and tended to contribute to basis risk for participants. More recently, market participants have agreed an auction procedure that allows for the cash settlement of most contracts, while still allowing for physical settlement when mutually agreed by buyers and sellers. This seems to have significantly reduced the susceptibility of CDSs to short squeeze problems.

Another problem that has come to light in the CDS market, although it applies to interest rate swaps and other OTC derivatives as well, is that over time through the dynamics of trading derivative positions are added which are aimed at offsetting the economic effect of an earlier trade but leave the agent with two contracts. Both involve counterparty risk, and if they do not have exactly matching terms, then periodic cash flows will not be exactly offsetting. The latter problem has been dealt with through the introduction in 2009 of a market convention to always use standard contractual coupons

(e.g., 100 basis points – bps – or 500 bps in North America) and standard dates (the 20th of March, June, September and December). The accumulation of counterparty risk can be avoided if initial contracts are cancelled rather than offset with a new contract. There have been industry efforts to increase the use of contract cancellation in bilateral OTC contracts, and this has been facilitated by the increasing standardisation of contract terms.

There is a widespread recognition that the counterparty risk in OTC derivatives is potentially a major problem and that industry efforts to reduce it in the context of bilateral settlement are not likely to deal with the problem satisfactorily. This is the basis of the current major push to establish multilateral settlement through central counterparties (CCPs) as the industry norm for most CDS contracts. This is the agreed intent of the major market participants, and it is likely to be backed by force of law through new legislation in Europe and the United States. While the operating details (and costs) differ across CCPs the principles are by now widely understood. When a swap trade is agreed between a buyer and seller, it is then cleared through a CCP which becomes the counterparty to each leg of the trade. In the case of default by one side, e.g., the seller, the CCP absorbs the loss and continues to honor its obligations to the buyer. The CCP keeps the risk of any default at low levels through its system of margins. And the solvency of the CCP itself is assured by setting margins at adequate levels relative to the underlying risks.

It should be emphasised that a CCP is not the same thing as a derivatives exchange and that using CCPs is compatible with continuing to negotiate CDS contracts in a dealer based OTC market. It seems clear that if CCP clearing becomes the industry norm this could deal quite effectively with most problems of counterparty risk and that this would facilitate the smooth functioning of a liquid CDS market.

There still remains strong current of opinion which advocates the further step of forcing CDS trading onto recognised derivatives exchanges. What are the arguments in favor such a requirement? One argument is that a dealer based CDS market is less efficient than would be an exchange and that dealers derive oligopolistic profits that could be

eliminated by competition on an exchange. While dealing with this argument would take us off our main subject, it is worth making two points. First, this is an argument that would seem to apply to OTC derivatives markets in general and to have nothing particularly to do with the specifics of CDS contracts. Second, the relative advantages and disadvantages of alternative forms of market organisation have been debated in the literature on financial market microstructure without coming to any very settled prescription as to the best market form.

What of the argument that is sometimes heard that CDS contracts make "shorting" credit too cheap? This lies behind the call for banning "naked shorts," that is buying CDS protection when the agent does not own the underlying credit. First, it should be noted that the matter of whether buying CDS credit protection is cheap or dear is determined in the market. For example, at the time of this writing the price of buying CDS protection on an investment grade name is on average 120 bps. Thus, if one assumes a recovery rate of 40% which is a fairly standard assumption for corporate bonds, for USD 120,000 per year one can buy the chance of receiving USD 6 million on a face value of USD 10 million. Is that cheap or dear? If one were to assume the one year probability of default is 0.163% which coincides with the historical average over 1970-2008 for corporate bonds rated Baa by Moody's, this translates into an expected payment of USD 9,780 far less than the direct cost of protection. In fact, the probability of default implied by the current price is approximately 2%, that is, higher than the historical average by a factor of 12. Presumably many agents might not consider this very cheap. In fact, similar, but much more refined, calculations along these lines have led many economists to conclude that it is a puzzle that cost of credit protection in CDS is so high on average.⁹

A second observation is that the idea that CDS makes short selling cheap is a repeat of the oft heard complaint levelled against derivatives in general. There is nothing particular about CDS that makes the argument either more or less compelling than for derivatives in general. The fact that the argument has not held sway in derivative markets generally, suggests that unless some further evidence comes forward there is a presumption that this does not

⁹ Saita (L.) (2006).

constitute a basis for shutting down these types of trades. Finally, it should be noted that a practical matter an effective ban on naked shorts would in all likelihood eliminate the attractiveness of the market for the whole range of cross hedging purposes where establishing that protection buyers have a material hedging interest would significantly increase the costs of transacting. The resulting loss of liquidity would in turn increase the costs of hedging, both in terms of bid/ask spread and in terms of average risk premium, even for agents holding the specific claims underlying the CDS.

Finally, it has sometimes been argued that single name CDS contracts may have an adverse effect on lenders. A mild version of this criticism is that if a bank hedges the risk on a loan granted to a corporation, then it will no longer have the incentive to monitor the firm after the loan is made nor to maintain high underwriting standards. On strictly theoretical grounds, this criticism may have some merit. Banks may be particularly eager to hedge credit risk on a name when the financial condition of the firm is poor. Sellers of credit protection will take into account this possible private information and will command a higher spread as a result. The equilibrium that emerges in the face of such private information may be better or worse with CDS trading than without.¹⁰ However, when there is an established banking relationship, reputational considerations serve to mitigate problems of inefficient monitoring.¹¹ Thus there is no general result that would distinguish clearly between good and bad forms of risk transfer by banks which monitor borrowers.

A more extreme version of this criticism is that the bank which purchased CDS protection on a firm may have the incentive to withdraw credit the firm and thus provoke a default by a distressed firm. Behavior of this sort may well be found to be illegal. The applicable laws vary across jurisdictions. For example, in English Common Law countries, if a bank were judged to induce the bankruptcy of a firm because it stood to gain on the CDS contracts this could be deemed a violation of the loan agreement depending upon specific terms set out in the contract.

4| CDS CONTRACTS ON INDICES

As the market for single name CDS contracts developed, it became obvious that such contracts had one major drawback for a bank or other financial institution managing a portfolio of credit risks. To reduce overall exposure to *systematic* sources of credit risk it was necessary to buy a portfolio of single name CDS contracts. This involved considerable time and transactions costs. Furthermore, if single name CDS spreads priced both systematic and idiosyncratic risks, this strategy would be costly in that it did not take into consideration any of the gains from diversification. The response to these problems was to develop CDS contracts based on indices, somewhat analogously to derivatives on stock indices that have been popular since the early 1980's.

CDS contracts on credit indices have been successfully introduced for North American credits (CBX contracts) and European credits (iTraxx contracts). There are a wide variety of contracts that have been developed differing with respect to the specific index that is used. However, they all follow the same basic template. A given CDS contract is based on a specific portfolio of credits and calling for protection over a given time horizon at initiation, 5-years being the most popular. At its inception the new contract becomes the "on-the-run" contract in a series of similar contracts. The contract is "rolled" from time to time, with the initiation of a new on-the-run contract based on a new portfolio of credits but designed to capture the same segment of the credit risk market as others in the same series (e.g., North American, investment grade, senior credits). The older contracts in the series are "off-the-run" contracts.

The spread on an index CDS is set in the market by supply and demand in a manner similar to single-name CDS. CDS calls for a payment of a contract coupon periodically by the credit protection buyer. At the time of purchase the credit protection buyer pays to or receives from the seller an up-front payment depending upon whether the market spread is above or below the contract rate. Later if the market spread has risen the credit

¹⁰ Morrison (A) (2005) ; Chiesa (G.) (2008).

¹¹ Parlour (C.) and Winton (A.) (2008).

protection buyer is in the money on the contract and can monetise this gain, e.g., by making an offsetting trade. The contract is based on notional amount that is fixed in the initial contract but which is reduced subsequently as credit events on the underlying portfolio occur. For example, suppose the initial contract is for a notional of USD 50 million and is composed of 100 names. The protection buyer pays the contract spread on USD 50 million so long as no credit event has occurred. If one of underlying names incurs a credit event, then the protection buyer delivers a note on that name in the amount of USD 500,000 (= notional/number of credits) for which it receives par. Subsequently, the notional on the contract has been reduced to USD 49.5 million and involves 99 names. The protection buyer now pays a reduced amount for the credit protection because the notional amount of the contract has been reduced. Upon the next credit event the process is repeated and the notional is reduced by 1/99, and so on until all names default or, as is more likely, the expiry of the contract.

It should be noted that the market spread on an index CDS is not the same as the theoretical value of the index of the underlying CDS spreads. The basis of the index CDS equals its market quoted spread minus the underlying theoretical value.¹² In principle, arbitrage should assure a tight relation between the market spread and its corresponding theoretical value. However, in practice transactions costs and market thinness can result in substantial fluctuations of the basis.

One of the main benefits of index CDSs over single name CDSs is that they are attractive to a wider range of potential participants than those seeking to exchange risks on a single name. This tends to promote their greater liquidity. This in turn enhances their attractiveness for the purposes of risk shifting and price discovery. The greater liquidity of index CDSs is reflected in the fact that the market spread of an index product often leads its theoretical value. Furthermore, by design index CDSs are aimed at transferring systematic risk that lenders cannot otherwise control through screening or monitoring. This tends to improve the efficiency of intermediation.¹³

Another advantage of index CDSs is that they are less prone to problems of manipulations. As with single-name contracts, they are based on listed names about which considerable information circulates in financial markets. However, unlike single-name CDSs, since they are based on a broad portfolio, there is relatively little incentive to attempt to exploit informational advantage that an agent may have on some narrow segment of the credit market. Furthermore, by the nature of the way credit events are treated in index CDSs, any improvements in the underlying single name CDSs that come from the introduction of auction settlement also aid in reducing possible manipulation problems for index CDSs.

If there is a significant problem with index CDS, it is basis risk. The constituent portfolio may differ significantly from a given hedger's own portfolio. Furthermore, as already discussed, the market spread of an index CDS can diverge at times from its own theoretical value. This was experienced by a number of banks during the crisis of 2007-2008 when the quality of their index hedges was found to deteriorate. However, it should be noted that basis risk is a cost of using index CDS that should be fully internalised by private agents when making their decision to use such contract.

5 | SOVEREIGN CDSs

Formally, there is little difference between a single name corporate CDS and a CDS contract based on obligations issued by a sovereign entity. Since sovereign entities are not covered by bankruptcy laws applicable to corporations, bankruptcy is not credit event for sovereigns. However, the other forms of credit events including failure to pay or restructuring do apply to sovereign CDSs. Quotation and settlement procedures of single name corporate CDSs are applicable to sovereigns as well.

Sovereign debt is traded actively on global financial markets. The information that is available to participants in the sovereign CDS market will differ from case to case depending upon the sovereign entity in questions. Generally, one can expect the

¹² Note that "basis" is a context specific notion. The basis referred to here is not to be confused with the difference between the on-the-run spread and an off-the-run spread nor with the difference between an index CDS spread and a theoretical spread based on a hedger's own portfolio of credits. Traders refer to "my basis" as the price difference that they are following.

¹³ See Chiesa (G.) (2008).

sovereign market be larger and more liquid than the corporate bond market (if it exists) for firms in that country. The larger the country and the more transparent and reliable the reporting on its fiscal condition we can expect a more liquid market. Of course, if the prospect of sovereign default is extremely remote there will be very little hedging demand and the market may be inactive. However, for active sovereign markets, liquidity and transparency are sufficient to mean that problems of short squeezes would not be a particular impediment to CDS trading.

All these observations suggest that when underlying sovereign debt is traded actively, a liquid CDS market can emerge which would serve the purposes of risk shifting and price discovery. If so over time it can be expected to help lower the costs of sovereign borrowing.

Despite these observations, sovereign CDS trading has attracted a number of vocal and influential critics, precisely because of its potential liquidity. The particular complaint is that it leaves sovereign borrowers open to speculative attacks because it facilitates short-selling through the purchase of credit protection in a CDS. How would such an attack work? This has been described in many models of financial crises. A basic scenario is as follows.

A government faced with a high current fiscal deficit, engages in a borrowing program by making a promise to reduce deficits in the future. In projecting these deficits it makes assumptions about growth of tax revenues and of the costs of borrowing. These two are interdependent. If the market believes the deficit projection, the borrowing costs will be moderate and the plan would be feasible. However, if the market does not believe the tax revenue projections, then the borrowing costs will be higher than projected, the deficit plan will be infeasible and the government will be forced to default or restructure its debt. Thus a crisis may arise in equilibrium as a self-fulfilling prophecy. As described there may be multiple equilibria. Recent models of crises based on global games show conditions on the information structure such that crises may emerge as a unique equilibrium.¹⁴

Now large sovereign defaults have occurred in the absence of active CDS trading. Both the Russian default of 1998 and the Argentine default of 2001 involved elements of a speculative attack – international investors abandoned the markets forcing a sharp increase in yields making it increasingly difficult to roll-over maturing debt – but did not involve CDS trading in any major way. So if sovereign debt crises can arise in the absence of CDS trading, why is sovereign CDS trading itself so suspect?

The answer seems to be that it contributes to the liquidity of the market for sovereign debt and that is undesirable in itself. That is, they grease the wheels of capital flows when in fact it would be desirable to throw some grit into those wheels instead. Whether capital mobility is a good or bad thing is a broader question about which we have nothing to say here. However, it seems that sovereign borrowers welcome liquidity when it lowers their borrowing costs as was the case with a number of countries that have joined the Euro zone. To oppose liquidity in some markets and encourage it in others does seem rather inconsistent and self-defeating.

Another possible fear, which again just repeats a fear often expressed about derivatives generally, is that CDS trading may be so large as to swamp the underlying sovereign bond market and that this would somehow provoke a sovereign default. This argument has problems on several grounds. First, as has been pointed out recently in the context of the problems on Euro zone debt, it is not factually correct. The sovereign CDS market has been relatively small compared to the underlying debt markets.¹⁵ Second, if the CDS market were to grow under pressure from speculators seeking to buy credit protection (naked shorts) they would have to be met by sellers of credit protection. Who would all those sellers be? It is likely that the CDS spread would rise and that the naked shorts would be forced to pay dear for their bets. (See the calculation for single name corporate CDSs above). Finally, if CDS open interest were very large compared to the underlying cash market, in the event of default, the settlement process (whether based on auction or otherwise) would force the CDS longs to buy the underlying cash instruments. This would bid their price up and would reduce the

¹⁴ See Morris (S.) and Shin (H.-S.) (1998).

¹⁵ See Duffie (D.) (2010).

net payments protection buyers receive. Thus there are clear market forces that would tend to keep the scale of CDS trading in reasonable proportion to the size of the underlying sovereign debt market.

Finally, would it be possible that a sovereign CDS conveys information that would lead to crisis? For example, could a rising CDS spread itself attract attention to the fiscal difficulties of a sovereign borrower and in this way raise borrowing costs? This argument does not seem very strong. As has been emphasised in the global games analyses of crises, the key ingredient to give rise to crises is a degree of imperfect information among market participants about the underlying fundamentals of the market.¹⁶ It is hard to see how the presence of CDS trading or its absence greatly affects the availability of information about the future fiscal health of a sovereign borrower. The key to seeing off an unwarranted speculative attack in a sovereign debt market is for the public authorities to provide information about a credible fiscal plan.

6 | CDSs ON STRUCTURED PRODUCTS

Structured credit products such as collateralised debt obligations (CDOs) and collateralised loan obligations (CLOs) emerged in the 1980's borrowing techniques developed earlier in the securitisation of mortgage pools. From those beginnings the market grew strongly and a wide variety of different structures were introduced, the details of which were only really understood by a fairly narrow group of specialists. Later, after the introduction of CDS trading, it became fairly natural to begin to write CDS protection on securitisations. After all, a tranche of a securitisation is a fixed income instrument that is equivalent to a corporate bond in the sense that it pays coupon interest until maturity or until default occurs. The innovation proved successful and CDSs on securitisations were actively traded at

least until the whole securitisation market collapsed in the crisis of 2007-2008. The fact that CDSs became linked to CDOs in people's minds probably explains why the CDS market earned the reputation for being complex; whereas, as we have seen, in its basic mechanics a CDS is rather simple. Indeed, CDSs often did play a role in resecuritisations, the so-called CDOs-squared, which came to epitomise the process of financial innovation run-amok.

A CDS contract on a securitised tranche is not inherently different from a CDS on an index of corporate names. There is an underlying reference portfolio of credits and the contracts calls for the credit protection buyer to pay coupon interest on the notional amount outstanding. The notional amount outstanding is reduced by credit events in the manner described above for index CDSs. The difference, however, is that the reduction of notional is applied only for certain range of losses. For example, a CDS on a mezzanine tranche of a structure may have a lower attachment point at 5% and an upper attachment point at 10% of losses. As losses on the underlying portfolio occurred affecting 0 to 5% of the credit, there would be no change of the notional on the CDSs. As losses would arise above the 5% threshold, the CDS protection buyer would be compensated for losses. The notional amount of the CDSs would be reduced until the threshold of 10% losses is reached at which point the CDS expires.

The complexity of a CDS on a tranche derives from the complexity and lack of transparency of the underlying structure. The securitisation process has always been a ratings based business, and this feature of the market was reinforced with the Basel II standards which gave credit ratings agencies (CRAs) a critical role in setting regulatory capital requirements. Ratings are meant to aggregate underlying information, and by their nature they transform information sensitive assets into information insensitive assets. The latter are attractive to investors precisely because they feel that they do not need to actively monitor the assets. In the fall-out of the crisis of 2007-2008,

¹⁶ As phrased in Hyun Shin's summary of Morris and Shin 1998, "Information plays a very subtle role in speculative crises. What is important in staving off currency attacks is not the amount of information made available to the market, per se, but rather how public and transparent this information is. If market participants are well informed about the fundamentals, but they are unsure of the information received by other participants, and hence unsure of the beliefs held by others, speculative attacks may be triggered even though everyone knows that the fundamentals are sound. Our analysis highlights the importance of the transparency of the conduct of monetary policy and its dissemination to the public. If it is the case that the onset of currency crises may be precipitated by higher order beliefs, even though participants believe that the fundamentals are sound, then the policy instruments which will stabilize the market are those which aim to restore transparency to the situation, in an attempt to restore common knowledge of the fundamentals." http://www.nuff.ox.ac.uk/users/Shin/curr_abs.html

it became apparent that many securitisations were bought simply on the basis of their rating and that investors did not, and in most cases, *could not* learn much about the risk characteristics of the asset pool underlying the structure.

Thus unlike single name or index CDS based on underlying corporate borrowers, CDS contracts on securitisations were based on an opaque underlying cash instrument. This would seem to be a major impediment to the trading such instruments. Despite this fact, CDSs for securitisations developed on a large scale over time. Why? The answer is that they served a very useful function in the securitisation. Specifically, CDS could be used as a credit enhancement that would allow the super-senior tranche of a securitisation or resecuritisation to achieve the coveted triple-A rating. The sellers of CDS protection were often monoline insurers who would sometimes use such contracts as an alternative to the financial loss insurance policies that had long-been used as a credit enhancement in securitisations.

The advantage of monolines over other writers of CDS protection was that because of their triple-A rating they were able to command high spreads. We now see that this commercial advantage meant that until late 2006 they built up large positions in the fast growing ABS segments including those based on subprime mortgages. The fact that these contracts represented a very large implied exposure to the general level of the US property market went largely unnoticed until difficulties in that market emerged in mid-2007. It now seems clear that the lack of transparency of the underlying asset markets and the complexity of the structure in which CDSs were just one component part contributed to the failure of the market participants to understand the nature of the economic risks they had taken on.

Now even sophisticated investors have largely lost their appetite for the risks of complex financial structures. The securitisation industry has been greatly reduced as a result. It may take a long time before the market strengthens. If and when it does, probably investors will be wiser in their risk assessments. They will probably demand better information about risks and greater returns for bearing them. However, the experience of securitisations has proved to be an object lesson in the limits of *caveat emptor* in the face of financial innovation. This has led some to call for

a more active public regulation of such innovations. There is some precedence for such regulations. The Commodity Futures Trading Commission has long had responsibility for vetting new products proposed for trading on derivatives exchanges in the United States. In retrospect, it does appear that the balance of benefits in risk sharing and price discovery provided by tranche CDSs versus their costs quite likely were negative. Whether or not a regulator would have been able to assess this clearly *ex ante* may be open to debate. However, if, in the future, innovation in CDS trading is brought under regulatory oversight, the analysis that we have provided gives some guidance on how it should be done. The primary question to be answered by all concerned is whether the underlying cash market is sufficiently transparent so as to allow risks to be assessed by both buyers and seller of credit protection on these instruments.

7 | CAN CDS MARKETS PROVIDE INFORMATION TO GUIDE PUBLIC POLICY?

We have argued that like other derivatives CDS contracts serve a social purpose as an aggregator of information of diverse market participants. In this price discovery role they can help to guide resources toward investments that are best on a risk adjusted basis. This informational function is carried out naturally in the private market without the direct involvement of any public sector agent. Now the question arises whether in addition to this function, CDS contracts can be of more direct use to public authorities. In particular, can CDS contracts convey information to regulators that *they would not otherwise have* and thereby help them to better implement policy?

In particular, there have been several proposals to use CDSs spreads in developing new tools for macro-prudential regulation. Oliver Hart and Luigi Zingales have argued that CDS contracts written on banks could be used to monitor their solvency. An increase in the CDS spread would be a signal of a worsening in the financial position of the bank and thus might serve as a trigger for some form of corrective action. Huang, Zhou, and Zhu have developed a proposal for a regulatory capital surcharge that could be assessed on systemically important banks

that would incorporate information from the CDS market.¹⁷ In particular, their capital charge would be implemented using the large banks' CDS spreads to identify their probability of default (PD) and high-frequency equity information would be used to estimate asset return correlations.

There are important reasons why such proposals may be misguided or at least premature, pending a better understanding of the behavior of pricing on the CDS market. In particular, CDS spreads cannot be taken in any direct manner as a proxy for the true probability of default of the name underlying the contract. Like prices of any financial asset, the market price of a CDS is based on the *risk neutralised* distribution of the underlying risk. At any given time, the CDS spread quoted on the market will be a composite of (1) the market's assessment of the physical default distribution (PD, LGD), (2) a risk premium reflecting the market price of default risk, (3) a bid/ask spread reflecting liquidity on the CDS market, (4) a discount reflecting the value of the delivery option on the CDS, and (5) a discount for the counterparty risk in the CDS. Thus changes over time observed in CDS spreads could reflect changes in any of these five factors. It would be an error to assume that factors (2)–(5) are constant and infer from an increase in spreads that the underlying name's probability of default necessarily had gone up.

In a recent study I have tried to see what are the dominant factors accounting for changes in spreads over time.¹⁸ I estimate the risk neutral distribution of defaults using time series data on CDS spreads. I use estimates of the physical default distribution derived from default histories. Combining the two I identify the implied distribution of the market price of default risk. I find the volatility of the price of default risk dominates that of the physical default intensity by a factor of about 10. Thus changes in the CDS are more likely to reflect changes in the market's willingness to bear default risk on the name rather than changes in the solvency of that name. This suggests that the reliance upon CDS spreads for the purposes of macro-prudential regulation as in Huang *et al.* (2009) or as proposed by Hart and Zingales is likely to be misguided unless there is an adequate control for changes in spreads attributable purely to changes in the markets' pricing of credit risk.

This is not to say that public authorities should ignore CDS spreads. On the contrary, they probably should be monitoring spreads on banks as a supplement to their own information on bank solvency obtained through their normal surveillance activities. However, there is no reason at all to relax those surveillance activities because a CDS market exists. Indeed, in light of the recent crisis, it would seem important now more than ever that regulators reinforce the access to information and that they lead, rather than follow, the market.

¹⁷ Huang (X.), Zhou (H.) and Zhu (H.) (2009).

¹⁸ See Anderson (R.) (2009).

We have emphasised that the credit default swap is a financial derivative contract similar to others that have long been an integral part of our financial system. The innovation in CDS trading was to make a commitment about a future transaction contingent on an uncertain event, namely, the default by the underlying credit. Like other derivatives it can provide significant social benefits in risk sharing and price discovery. However, these benefits can be undermined if the contract proves to be prone to manipulations or if it does not deal with counterparty risk adequately. In its first 15 years of development largely as an OTC market, the CDS market has gone through a number of refinements to deal with these potential problems. The risk of short squeezes appears to have been reduced significantly with the organisation of auctions for settlement following credit events. Standardisation of contract terms has facilitated contract cancellation which has helped to reduce problems of the accumulation of counterparty risks. The current push by industry and by regulators toward central counterparty clearing is likely to further reduce counterparty risks very considerably.

On balance it seems that the CDS market for corporate issuers, either of the single-name variety or when based on indices, has been favorable for the efficiency of credit markets. With their advent the business of credit risk management has been transformed to become much more market based. Lenders have a much better knowledge of the risks that they take on, and they have much greater scope for actively managing those risks.

We have identified two outstanding issues involving CDS contracts which are legitimately the subject of current policy debate. The first is whether by facilitating the trading of default risks, CDSs may make a market prone to speculative attacks on the underlying credit. This is probably the only major doubt one can have about the market for sovereign CDSs which otherwise is likely to provide the same efficiency benefits seen in trading corporate CDSs. We have argued that the heart of the problem of speculative attacks on sovereign borrowers is one of providing credible public information about the future solvency of the borrower. The presence or absence of CDS trading has little effect on this. The second outstanding policy issue is whether the market can be relied upon to foreclose the development of a CDS market when the underlying cash market is too opaque to permit the informed assessment of risks by buyers and sellers of credit protection. The example of CDS contracts on tranches of securitisations and the role played by such contracts in the ill-fated CDO-squared's leaves one with reasonable doubts on the question. The CDS contracts themselves were fairly simple but for a time they played an important role in the construction of very complex structures which exacerbated the important defects of the securitisation market including the excess trust put in external ratings and in the lack of transparency about the assets pools. A degree of regulatory oversight on the introduction of new CDS products might be justified to assure there is an adequate flow of information on underlying risks.

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Fiat lux – Shedding new light on derivatives markets

MICHEL BARNIER

*Commissioner for Internal Market and Services
European Commission*

Not so long ago, we policymakers thought we knew just what challenges we were facing for Europe to better take advantage of globalisation through a more sustainable model: these were climate change and a rapidly ageing society. However, since 2007 we have also learnt that there was another area requiring a deep sustainability check: the financial system. What started in 2007 as a credit crisis in the US market for subprime mortgages turned into a full-blown global financial crisis in 2008, following Lehman's default and has taken us near to a sovereign debt crisis as countries face the fiscal consequences of financial instability, on top of large public indebtedness.

This highlights the importance of the financial system for society as a whole and, therefore, the political imperative of mending it so that finance serves the real economy – not the other way around. We therefore need to put in place a new set of rules and principles ensuring a stable and sustainable financial system. Without this our whole economy will be impeded from prospering again and we will not be able to address the challenges outlined above.

This issue of the *Financial Stability Review* is therefore timely and welcome, as it puts the focus on one financial instrument that has played an important role during the crisis – over-the-counter (OTC) derivatives – thus allowing me to highlight the significant changes our approach to regulation in this area has to take.

1| OTC DERIVATIVES: USEFUL, POPULAR AND RISKY

Derivatives are financial contracts that trade and redistribute risks generated in the real economy, and as such are important risk management tools for economic agents. There are many types of derivatives. Some are standard products (e.g. futures) while others are not, as each contract is tailored to the specific needs of the user (e.g. swaps). Derivatives therefore play a useful economic role and it is not surprising that their use has grown tremendously over the last decade.

However, derivatives still give rise to risks. As risks are hedged on OTC markets, it is hard, in the absence of reliable public information about those markets, for market participants and supervisors to determine, for each such contract, whether risks have been effectively hedged and where the risk resides. The Commission Communication of July 2009 has highlighted how these risks played out during the financial crisis:

*"Derivatives in general and CDS in particular created a web of mutual dependence that was difficult to understand, disentangle and contain in the immediate aftermath of a default. Therefore, the crisis has clearly shown that the characteristics of OTC derivative markets – the private nature of contracting with limited public information, the complex web of mutual dependence, the difficulties of understanding the nature and level of risks – increases uncertainty in times of market stress and accordingly poses risks to financial stability."*¹

2| ADDRESSING OTC DERIVATIVES

The Commission believes that a paradigm shift must take place, with legislation allowing markets to price risks properly, away from the traditional view that derivatives are financial instruments for professional use and, as such, would only need, light-handed regulation. Europe cannot afford another situation where the risks of the financial sector are ultimately borne by the taxpayer.

It is therefore necessary to significantly improve the way risks are managed on OTC derivative markets. The G20 has succinctly defined the actions that needed to be taken: *"All standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements."*²

On the basis of its prior analysis, the Commission in October 2009 announced a set of actions for 2010 structured around four headings: reduce counterparty credit risk, reduce operational risk, increase transparency and strengthen market integrity and oversight. These actions will implement the G20 commitment in Europe.

- **Counterparty credit risk:** The risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter, has been brought to the forefront of attention by the crisis, which highlighted that market participants did not necessarily price counterparty credit risk adequately. Clearing is the way by which this risk is mitigated. Clearing can either occur bilaterally between the two counterparties or at central market level, by means of a central counterparty (CCP), thus involving appropriate collateralisation. The projected actions will therefore strengthen the clearing of derivatives both at central and bilateral level. This will be done by new Community legislation on CCPs that will (i) establish common

¹ European Commission (2009): "Ensuring Efficient, safe and sound derivatives markets," COM(2009) 332.

² G20 meeting of 25 September 2009.

safety, regulatory and operational standards; and (ii) mandate the use of CCPs for standardised contracts, in line with G20 conclusions. In addition, the Commission will amend the Capital Requirements Directive (CRD) to (i) mandate the supply of initial and variation margins; and (ii) substantially differentiate capital treatment of bilateral and CCP cleared transactions.

- **Operational risk:** Operational risk arises from inadequate legal documentation and internal processes for managing OTC derivatives contracts. Steps have been taken by industry to reduce operational risk. For example, legal documentation is now standardised for a considerable part of the derivatives market. Moreover, market participants are gradually moving to electronic processing of trades. These ongoing efforts are likely to be boosted by the mandatory use of trade repositories and CCPs. These efforts will result in more standardisation of contracts in terms of electronic processing and standard legal terms (without affecting the economic terms of the contracts), which will also facilitate central clearing. Even so, as not all trades will be sufficiently standardised to go onto CCPs, the Commission will carefully assess whether legislation will also need to strengthen the way operational risk is addressed for non-CCP cleared transactions.
- **Transparency:** OTC derivatives markets have clearly suffered from a lack of transparency of prices, transactions and positions. The lack of transparency to regulators and the market has hindered regulators from efficiently supervising derivatives markets in terms of systemic risk and market abuse. For market participants, it has created difficulties in accessing reliable prices, assessing risks, valuing positions, and checking best execution. A third set of proposals will therefore focus on increasing transparency. First, the Commission will propose (i) mandating that positions be recorded in trade repositories, but also (ii) regulating and supervising such repositories. Second, trading of derivatives

should become more transparent. Changes to the Markets in Financial Instruments Directive (MiFID) to this effect are needed and ways to ensure that standardised derivatives are traded on organised trading venues should be examined.

- **Market integrity and oversight** must be enhanced. Accordingly, the Commission will propose to clarify and extend the scope of market manipulation as set out in the Market Abuse Directive (MAD) to cover all OTC derivatives. Moreover, regulators should be given the possibility to set position limits to counter disproportionate price movements or concentrations of speculative positions.

These actions will be delivered in the course of this year and beginning of next year: I launched a consultation on 10 June to fine-tune the technical details of the measures to come on CCP clearing and trade repositories, and I intend to bring forward proposals on these issues in September; proposals relating to the transparency of trading, market integrity and oversight will follow by the end of 2010 or early 2011.

Once implemented, these reforms will bring much needed transparency to OTC derivatives markets and will significantly improve the way the market deals with the risks associated with derivatives contracts. They will also increase the upfront cost of engaging in speculation. Last but not least, they will strengthen our instruments to ensure market integrity.

Even so, recent events involving a particular type of derivative (sovereign credit default swaps) merit a renewed assessment to see whether additional actions are needed in this particular field. The Commission is currently assessing the facts and has included this dimension as part of another consultation launched on 10 June relative to short-selling. I do not exclude proposing further measures on the basis of the ongoing assessment and consultation.

These challenging times have taught us that finance has too great a social and economic impact to be left in the dark, and that no sector, no instrument, no place must escape the light of law. We now need to strengthen the governance and regulation of OTC derivatives markets as a part of mending the financial system and ensuring that it provides a sustainable contribution to the European economy. It is imperative that we succeed.

Euro public debt and the markets: sovereign fundamentals and CDS market dynamics

LAURENCE BOONE
Director, Chief French Economist
Barclays Capital

LAURENT FRANSOLET
Managing Director, Head of
European Fixed Income Strategy
Barclays Capital

SØREN WILLEMANN
Vice President
Barclays Capital

At the onset of the crisis, euro area – like all Organisation for Economic Co-operation and Development (OECD) countries – public finances have massively inflated, as is typical in financial crises. The major difference with the past is threefold: the synchronicity across countries of the increase, the debt levels which have been reached; and the existence of credit default swap (CDS) market which has influenced the dynamic of sovereign trading. In this note, we review quickly fundamentals before highlighting the role of the CDS market and the implications for sovereign trading.

1 | DETERIORATING FISCAL VARIABLES

In the wake of the financial crisis, public debt to GDP ratios increased sharply, by more than 20 percentage points of GDP within 3 years (2009-2011), as is generally the case following financial crises. Yet, this time is different because all OECD countries are concerned, because the starting position of most countries was not really good, bringing debt to GDP ratio to record high levels (unseen in peace time), and because most countries will have to face rising public expenditures and diminishing receipts because of unfavourable demographic trends. For the first time in a long period, the question of the sustainability of some countries debt levels and solvencies appeared more acute.

In this section we give a snapshot of the deterioration in the fiscal metrics across euro area countries, highlighting the differences between the discretionary and structural part of this deterioration and the cost of the financial sector rescue. These differences contribute towards explaining the

variations in the financial markets assessment of sovereign risk across these countries.

Breaking down in this way the evolution of deficits and debt (Table 1) shows that apart from Ireland, and then but to a much lesser extent Austria, Belgium, Finland and the Netherlands, most of the deterioration in public finances is not due to direct cost of the rescue of the financial sector. Most of the cost is due to a cyclical deterioration of economic activity – which can be seen as a second round effect of the financial sector crisis. Indeed, discretionary packages have been relatively small. That said, the increase in debt has been fastest for these countries that had already deteriorated public finance positions in the first place.

Financial markets focused quickly on these issues, and lead to a forceful re-appraisal of risks and prices. Greece is the country which was in the worst position but Spain, Portugal and Ireland have also been under the financial markets spotlight, though for different reasons and to a somewhat lesser extent. For Portugal, the concerns focused on an elevated debt to GDP ratio, large external

Table 1
Breaking down the evolution of public finances

(% GDP)

	2008		Deficit excluding discretionary measures (impact of recession and new structural measures) (A)			Discretionary temporary package (B) *			Deficit including discretionary package and higher interest payments (C)			Capital injection	Debt		
	deficit	debt	2009	2010	2011	2009	2010	2011	2009	2010	2011	2008-10	2009	2010	2011
Austria	-0.6	63	-2.4	-2.4	-2.9	-0.8	-0.5	0.2	-3.1	-2.9	-2.7	8.3	67	68	69
Belgium	-1.2	90	-5.0	-5.0	-4.7	-0.9	-0.3	0.5	-6.0	-5.2	-4.2	6.8	97	101	101
Finland	4.4	34	-0.5	-2.1	-2.7	-2.0	-1.0	0.2	-2.6	-3.1	-2.5	6.7	44	44	45
France	-3.4	67	-5.6	-7.3	-6.9	-1.8	-0.3	0.5	-7.5	-7.6	-6.3	0.5	78	84	88
Germany	0.0	66	-2.2	-3.3	-4.5	-1.0	-1.6	0.0	-3.3	-4.9	-4.5	3.3	73	76	78
Greece	-7.8	98	-12.3	-14.1	-10.1	-0.4	5.3	2.5	-13.6	-8.8	-7.6	4.8	115	126	135
Ireland	-7.1	44	-13.3	-16.0	-13.2	2.6	2.9	3.3	-14.2	-13.1	-9.9	45 **	64	98	109
Italy	-2.7	106	-5.1	-5.1	-3.9	-0.2	0.8	0.8	-5.3	-4.3	-3.1	0.9	116	118	117
Netherlands	0.7	59	-4.6	-4.7	-5.5	-0.9	-0.7	0.7	-5.3	-5.4	-4.8	9.6	61	69	72
Portugal	-2.7	66	-7.9	-8.6	-7.5	-1.5	2.2	1.0	-9.4	-7.6	-5.4	2.4	77	83	86
Spain	-3.8	40	-9.2	-11.5	-7.8	-2.1	2.9	2.1	-11.2	-8.6	-5.8	4.6	53	64	69
Total euro	-1.9	69	-5.1	-6.0	-5.6	-1.1	0.1	0.7	-6.3	-6.1	-4.8	4.4	79	84	87

* A negative sign reflects fiscal loosening; a positive one fiscal tightening. The methodology to break down the evolution of the deficit and debt to GDP ratio was described in Euro Themes, April 2009. The total deficit (column C) is the sum of the discretionary deficit (column B) and non discretionary deficit (column A); sometimes a difference of rounding may occur due to a high increase in interest payments.

** Include EUR 24 billion of additional capital injections deemed necessary, given the haircut applied by NAMA for purchasing assets.

Sources: National plans, Ecwin, Barclays Capital.

Table 2
Cross-border banking sector exposures

(USD billions at end-September 2009)

Banks	Exposure to:					Total
	Greece	Ireland	Portugal	Spain	Em. Europe	
Austrian	6	9	3	9	220	247
Belgian	8	42	12	47	120	230
French	79	69	36	185	156	526
German	43	193	47	240	203	727
Greek	-	1	0	0	57	58
Irish	9	-	6	34	1	49
Italian	9	23	7	33	163	233
Dutch	12	32	13	125	94	277
Portuguese	10	5	-	30	17	62
Spanish	1	15	87	-	10	113
British	12	192	26	121	14	365

Source: BIS.

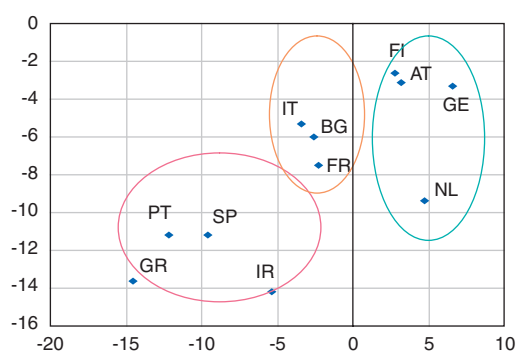
current account and low private sector saving ratio, together with a subdued potential growth (Chart 1). For Ireland, the state of the banking sector was of highest concern. Finally, Spain had as good an initial position as Ireland but it has been very severely hit by the collapse of the construction sector, which is affecting not only its banking sector, but also its growth model. Summarising the vulnerabilities of each of these countries show that markets have been correct in focusing on Greece, Portugal, Ireland, and finally Spain, in that order.

Looking ahead, and in the wake of sovereign market turbulences, most euro countries have now committed to adjust their public deficits

at a much faster pace than initially proposed, and than history suggests. No doubt, financial markets will keep monitoring closely the fiscal metrics and the commitments to fiscal consolidation, as well as the quality of the adjustment: given the euro countries integration (Table 2), fiscal adjustment across countries will have their impact magnified. Hence, it is not only the size of the adjustment and the implementation of the measures that markets will be watching, but the overall adjustment and growth strategy. Structural reforms will also have to be implemented to ensure financial markets that GDP growth will resume fairly quickly in spite of budgetary contractions.

Chart 1
Twin deficits across euro area countries

(% GDP; X axis: current account; Y axis: public deficit)



Sources: Barclays Capital, Eurostat.

2 | THE INTERACTION BETWEEN CDS AND GOVERNMENT DEBT MARKETS

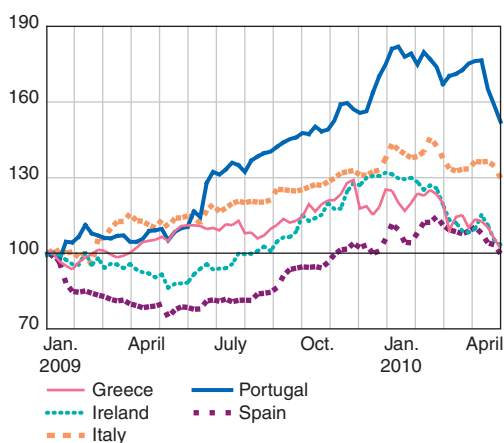
Global financial markets have been reacting to the fiscal deterioration seen everywhere in a much faster and stronger way than what has been the case before. This may be because of the heightened sensitivity of financial markets to such risks after the turmoil of the past few years. But one additional reason might be the emergence of the sovereign CDS market as a trading instrument and as a gauge of market sentiment (one has to look at just one widely available number, rather than compute spreads between bonds which generally do not have exactly the same maturity and characteristics).

THE SOVEREIGN CDS MARKETS IN CONTEXT

In both absolute and relative terms, the sovereign CDS markets have grown a lot recently (see Chart 2), even if for most specific sovereign credits, these markets are still relatively small, compared to the much larger, established government bond markets. While most commentators tend to focus on the absolute size of the CDS exposures compared to the size of the underlying bond markets, we think it is important to focus rather on the traded volumes in these markets. The difference between the two is illustrated in Chart 3. The first column shows the size of the net CDS exposure (as reported weekly by the DTCC, we took the 12 May amounts) as a proportion of the outstanding government debt in that market (as shown in the iBoxx index). These range between a few percentage points to a maximum 10% (for Portugal). For other developed countries (eg, Germany, France, United States, United Kingdom) typically, the proportion is even smaller (maximum 1.5%, and even lower for the United States and United Kingdom). Note that the proportion is quite higher in the corporate markets: for the largest issuers in iBoxx, net CDS exposure is on average 30% of bonds outstanding, varying between 20 and 50% between issuers. There has thus been a general assumption that the CDS market for sovereigns was as representative as for corporates and banks, while this is actually not the case.

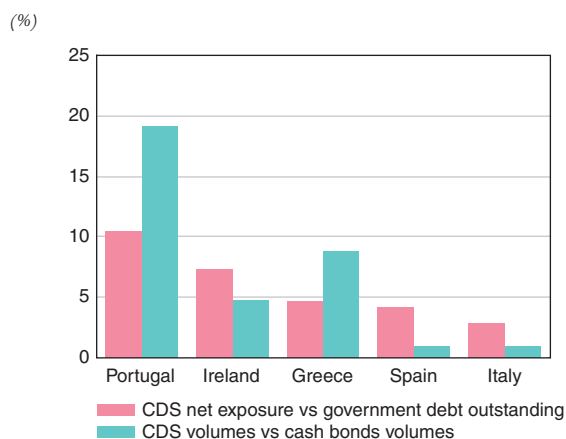
Chart 2
Net CDS exposures

(USD billions; 100 = January 2009)



Source: DTCC.

Chart 3
Government bonds and CDS markets compared (avg over past three months)



Sources: DTCC, Barclays Capital.

The second column in Chart 3 shows how the CDS and cash bond markets compare in terms of traded volumes. This is a bit more difficult to establish, on both the CDS side as well as on the bond side.

On the CDS side, the DTCC does not report volumes as such, but only gross and net exposures, as well as the number of outstanding contracts on a weekly basis. Broadly speaking, the traded volumes can be estimated by the rise in gross exposure (along with the number of swaps, which typically seem to have an average size of USD 25 millions), as compressions cycles (the netting of existing contracts) are relatively infrequent events, and the transfer of exposures between dealers is also fairly uncommon. This estimate should constitute the lower bound of activity, but should not be too far off the mark.

On the bonds side, the information available does vary considerably in the various euro area government bond markets. In some countries, only volumes traded by dealers on an electronic platform are reported (and these represent a varying proportion of the total volumes). In others, there is more detail or complete data sets (eg, Spain). We have taken the structures of the markets into account and come up with estimates of the total volumes by country. We recognise these may be off, though we are highly confident this would not change the overall picture, which is that in most markets, volumes traded in the sovereign CDS market are dwarfed by what is being

traded in cash bonds. One might argue that part of the traded volumes in the cash bond markets is just transfer of exposures between dealers which inflate bond markets volumes – in a sense, the bonds traded volumes probably represent an upper bound of 'real' activity. While there might be an element of that at times, there is no denying that issuance events (auctions, syndications) do constitute *bona fide* activity, and provide proper milestones in the price discovery process. It is interesting to note that in Western Europe only, there are five times more bonds being issued on a monthly basis than being traded in the CDS markets at this time.

Still, there are a few important exceptions. As shown in Chart 4, CDS volumes in Greece, Ireland and Portugal have moved quite higher than in other markets, and at times have been quite high compared to the volumes traded in the underlying bond markets (up to 30%, and probably even higher, if one were to adjust for measurement problems). Note that especially in late April and early May 2010, volumes in the Greek and Portuguese bond markets collapsed to close to zero, and therefore the relative importance of the CDS markets increased further. Interestingly, a high level of relative CDS activity has been typically associated to spread widening in these countries.

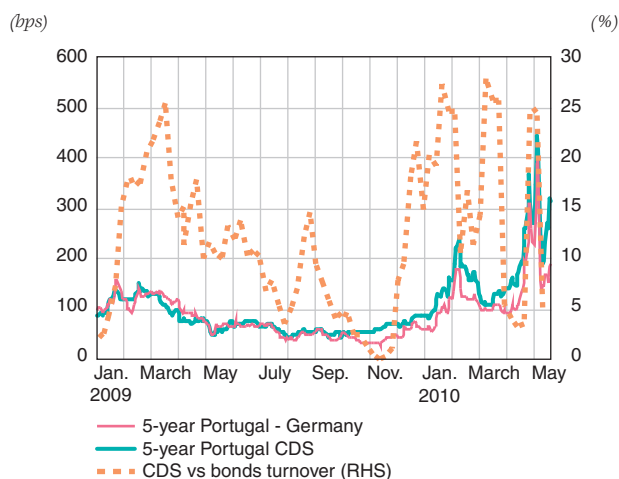
These charts show clearly that the CDS market has been much more active when spreads are volatile and widening. On the one hand, this is not

unexpected; market volatility tends to generate activity. The charts do not establish that activity in the CDS market leads the widening of spreads as such; the moves seem to be contemporaneous (similarly, an analysis of the evolution of cash and CDS sovereign spreads points to no particular lead or lags between them). On the other hand, both charts show that CDS activity drops quite a bit when spreads tighten. This would suggest that the sovereign CDS market tends to be dominated by players who are looking to buy protection (ie, be short in cash terms). This may be particularly the case in markets where it is more difficult to be short. For example, the Greek repo market is not centrally cleared, which limits the appetite of dealers and investors to be short in specific bonds. We suspect as well that the mark-to-market sensitivity of a number of CDS players might be higher than the one of those active in the cash markets (which would tend to be dominated by longer-term, more passive types of investor) – a factor that could generate more volatility.

3| THE 'CANARY IN THE COAL MINE' OR THE 'CAT AMONG THE PIGEONS'?

One might argue that the sovereign CDS market played the role of the proverbial 'canary in the coal mine'. It allowed the market to 'short' more efficiently and therefore improved the price discovery process and exposed the daunting fiscal challenges faced by a number of countries. Alternatively, one might argue that the sovereign CDS market played the role of 'the cat among the pigeons'. Spread widening, triggered by real issues, was exacerbated by the sovereign CDS market, where the price discovery process is more skewed towards 'shorts' than in the cash markets. The ensuing widening of spreads, and as importantly, volatility of these spreads, then caused cash market participants to adjust their positions (reducing longs or going underweight), with the move feeding on itself, and leading to a deterioration in the liquidity of the cash markets. Essentially, an initial CDS-driven move would thus have been followed by a generalised risk reduction and loss of liquidity (an explanation that is somewhat supported by the evolution of the cash-CDS basis, at times). Likely, the debate between one view or another will go on for some time.

Chart 4
Portugal: spreads and relative activity in bonds and CDSs



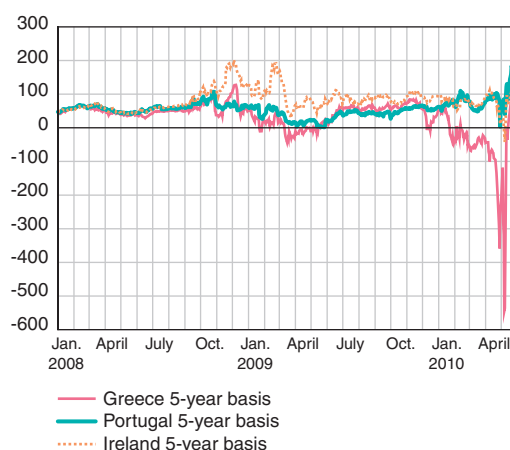
Sources: Barclays Capital, DTCC, IGCP.

4| THE CASH-CDS BASIS

Given the fact that approximately the ASW level of any sovereign bond should be equal to a CDS premium for the sovereign plus the appropriate funding level, investors should be able to buy or sell CDSs to take advantage of the relative movements between sovereign cash bonds in a liquid world. This also has the added bonus that this can be done without the relatively heavy balance sheet requirements imposed as a result of taking positions in the underlying cash bonds. The movement in the difference between CDS and the ASW level of the sovereign bond (which is called the "basis") can be explained most of the time by the changes in the repo funding spread of the bond over/below Libor (while there are other factors that affect the basis such as the CDS deliverable option and CDS counterparty risk, during the crisis funding spread has been one of the most important factors). However, sometimes the movements in the basis can be so extreme that the change in basis is not fully justified by changes in the funding spread which is typically seen at times of illiquid markets. This is particularly the case because the 'arbitrage' between these markets is imperfect, because of the nature of market participants, and transaction costs. The volatility of these bases can be seen in Chart 5: in a way it illustrates the varying biases that the CDS and cash markets can have over time.

Chart 5
Evolution of the cash-CDS basis (5-year)

(bps)



Sources: DTCC, Barclays Capital.

5| SOVEREIGN CDS MARKET DYNAMICS

With increased focus on sovereign CDSs and its interplay with government bond markets, it is important to understand the dynamics of the sovereign CDS market, with a particular view to the nature of the trading activity.

The CDS market is an OTC market and as such little public information is generally available on the flows in the market. However, one useful data source comes from the Depository Trust and Clearing Corporate (DTCC). Settlement and confirmation of CDS trades is a legal requirement and even if the DTCC does not have a monopoly, by their own calculations, about 90-95% of all CDS trades (including sovereign CDSs) are settled and confirmed through them. The DTCC data should thus give a fairly accurate picture of overall market activity.

In addition to providing indications of trading volumes for CDS contracts, as used earlier in this article, the DTCC also provides measures of "open interest" for CDSs. In particular we use two kinds of data:

- **Net risk taken.** We define net risk taken as the total amount of protection bought by counterparties who are net protection buyers, which equals the total amount of protection sold by net protection sellers. This is equivalent to a measure of "open interest." This measure is available on a weekly basis for both single-name sovereign CDSs as well as credit indices such as iTraxx SovX Western Europe.

- **Net client protection buying.** On an aggregate level – across all single names in a sector – and on an index level, DTCC also provides information on the net amount of protection bought by "clients" – and hence sold by "banks". This data is not available on a single-name level.

The split between "banks" and "clients" is somewhat tenuous. In the present context, exposures taken by "banks" are defined as any buying/selling of protection by any trading function in a bank – be it the market making function, treasury, counterparty risk desk or any proprietary trading desks. "Clients" in this context are then any other market participants that are not banks: hedge funds, asset managers, and insurance companies predominantly.

6 | CLIENT POSITIONING IN SOVEREIGN CDS: MACRO LEVEL

Using DTCC data, we show net protection buying (USD billion) across all sovereign entities globally by clients in Chart 6 along with the development in the 5-year iTraxx SovX Western Europe index, highlighting the dynamic nature of sovereign CDS markets. iTraxx SovX Western Europe is a liquid, equal weighted index of 15 single-name sovereign CDS contracts covering essentially all of Western Europe.

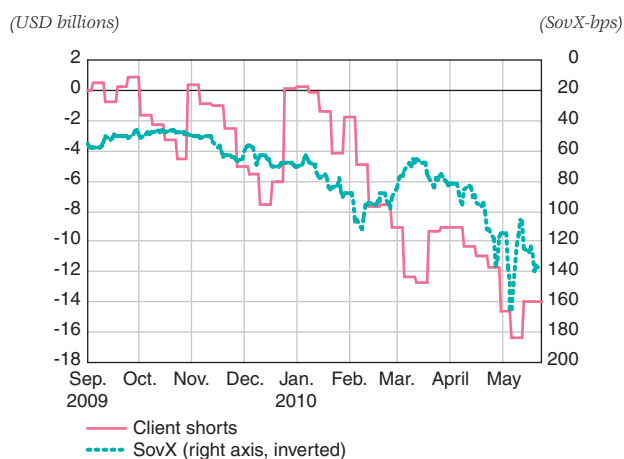
From October 2009 to November 2009, clients sold USD 4 billion of protection to banks across sovereigns, and subsequently went flat, and then started selling protection – for a total of USD 8 billion into late December – and went flat into January again. As SovX started widening at the beginning of the year, clients (on a net basis) started selling significant amounts of protection, reaching USD 16 billion of net protection sold in early May, as spreads reached their peak of 160 basis points (bp). Into late May, we have seen clients buying protection again.

In this context, with the pattern of a build-up in protection selling and then exiting, it is worth bearing in mind which counterparties are classified as clients

and which are dealers. Within banks, we have no objective information on the relative positioning – and general behaviour – of the different functions. Market makers would generally try to remain overall flat but some can take general trading views or hedge their sovereign CDS exposure with either government bonds or, for example, CDSs on banks. This means that even if a bank is flagged as being a net buyer of protection from the market-making function, they could in reality be flat, having hedged the exposure on another market. Counterparty risk desks are generally buyers of protection and due to their main function, they tend to be relatively price-insensitive and buy protection for the amount they need at the price they face in the market. Proprietary trading desks can be both buyers and sellers of CDS protection, using sovereign CDSs to take either an outright spread view or express relative value views between countries, as could be done via government bond markets.

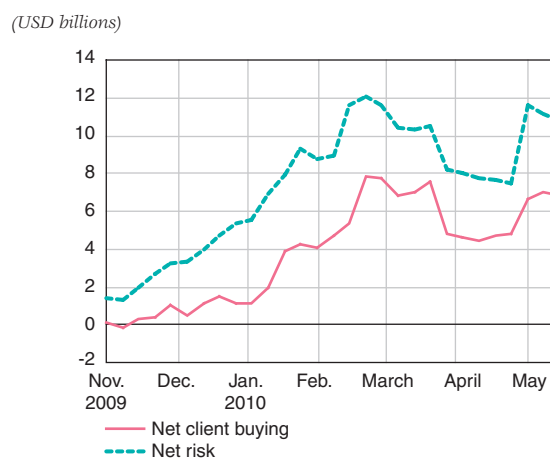
Since September 2009, asset managers and hedge funds have, on a net basis, been selling protection on sovereigns while banks – counterparty risk desks, proprietary trading desks and market-making functions – have been buying protection. On the opposite side of single name sovereigns, clients have been net buyers of protection in iTraxx SovX Western Europe (Chart 7) – building up from being flat in November 2009 to being buyers of USD 7 billion of protection into late May 2010.

Chart 6
Change in net client protection buying in sovereigns globally vs 5-year iTraxx SovX Western Europe



Sources: DTCC, Markit, Barclays Capital.

Chart 7
Net client buying of protection and net risk taken across dealers/clients in iTraxx SovX Western Europe



Note: iTraxx SovX Western Europe Series 2 only.
Sources: DTCC, Barclays Capital.

7 | CASE STUDY: GREECE AND THE UNITED KINGDOM

In Chart 8 and Chart 9 we compare the developments in cumulative net risk taken to the 5-year sovereign CDS spreads for Greece and the United Kingdom.

For Greece, from September 2009 into December 2009, investors added risk for about USD 1.7 billion (both longs and shorts). This happened in a period where spreads, until around November 2009 where the Greek budget deficit was restated, were only marginally increasing. I.e., in a fairly stable market, some investors were buying USD 1.7 billion of (new or additional) protection on Greece, with other investors happy to sell protection at the given spread levels, taking more risk to Greece.

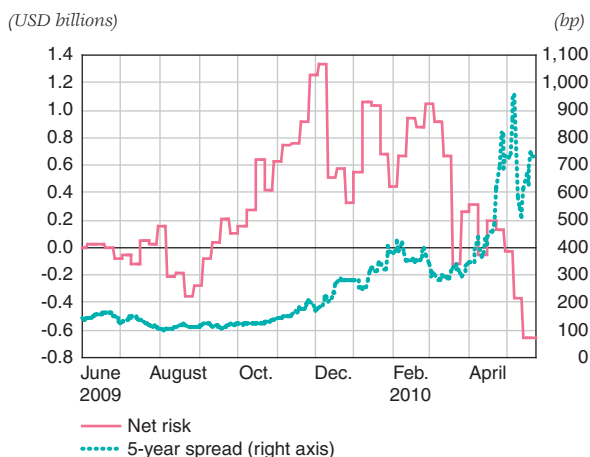
As Greek CDS spreads started widening from November 2009, net risk on Greece did not increase, in fact it dropped (even though it was highly volatile). To us, this is an indication that the investors who bought protection on Greece previously were unwinding into the widening market, taking profits and selling the protection to investors who, earlier, were not sellers of protection: i.e. the holders of the protection shifted at new prices in the market, but there was in general not any "new" (or more) risk being taken.

In May 2010, amid significant spread volatility, we have seen persistent risk reduction of about USD 700 millions.

For the United Kingdom (Chart 9), we get a distinctly different pattern in net risk taken compared to spread movements. Net risk taken in the United Kingdom is virtually constant between June 2009 and December 2009, even as the sovereign CDS spread on United Kingdom started widening in November 2009 into December 2009. Investors then start taking additional risk to the United Kingdom, in an ever increasing pattern, from December 2009 into March 2010, adding USD 4 billion of risk in an environment where spreads are fairly stable or widening. From March 2010 to April, there is little change in net risk taken but at the beginning of April and continuing into later May, we see net risk increasing towards and after the 6 May general election.

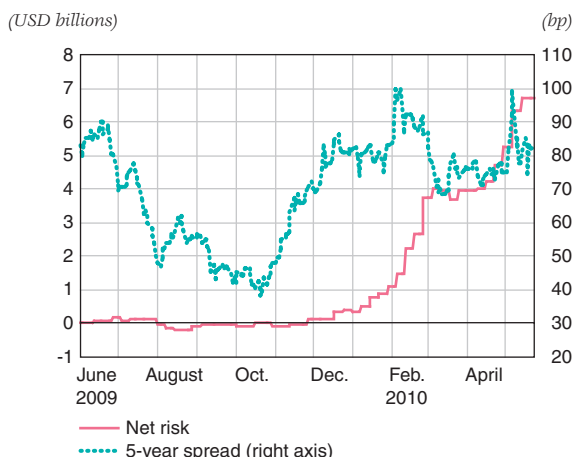
These two case studies illustrate the vastly different interactions between risk taking in CDSs across different sovereigns: for Greece, risk taking by market participants occurred predominantly before any significant price action, while for the United Kingdom, change in risk taking is almost a reactive phenomenon – some investors adding risk after spreads have widened out initially.

Chart 8
Greece – cumulative change in net risk taken since June 2009 vs 5-year spreads



Sources: Markit, DTCC, Barclays Capital.

Chart 9
United Kingdom – cumulative change in net risk taken since June 2009 vs 5-year spreads



Sources: Markit, DTCC, Barclays Capital.

Derivatives: an insurer's perspective

HENRI DE CASTRIES
Chairman and Chief Executive Officer
AXA Group

BENOÎT CLAVERANNE
Senior Vice President European and Public Affairs
AXA Group

The business model of insurance companies and their role in the economy and for policy holders make the use of derivatives key instruments to manage their risks. Insurers bear some specificity compared to other markets' participants in derivatives markets: their purpose is mostly hedging and, structurally, insurance companies do not take leveraged positions. Derivative instruments are a reality for an insurer like AXA as evidenced by figures and processes in place ; and Solvency II will most likely increase derivative hedging. Throughout the crisis, management of derivatives revealed significant improvement needs. But derivatives passed the test. Of course, there is a need for better regulation and insurers' support many ongoing initiatives. However, OTC contracts play an instrumental role for insurers and their role and importance should be acknowledged.

The business model of insurance companies and their role in the economy and for policy holders make the use of derivatives key instruments to manage their risks. However, insurers bear some specificity compared to other market participants in derivatives markets: their purpose is mostly hedging or increasing investment strategies efficiency and, structurally, insurance companies do not take leveraged positions. For an insurer like AXA, the use of derivative instruments is a reality. And Solvency II will most likely increase even more the use of derivatives for hedging purposes. Throughout the financial crisis, derivatives management revealed significant improvement needs. But derivatives ultimately passed the test. Of course, there is a need for better regulation and insurers support many ongoing initiatives. Listed derivatives as well as over-the-counter (OTC) contracts play an instrumental role for insurers and their role and importance should be preserved.

1 | RISK MANAGEMENT IS CONSUBSTANTIAL TO INSURERS' BUSINESS

Risk management is at the core of insurers' business. They accept risks on one hand, and they manage them on the other. And normally, these activities are performed to set up a win-win and profitable relationship for the policyholder and the shareholder. To do so, an insurer pools the risks it bears by writing insurance on large numbers of policyholders, whose risks of loss are more or less statistically independent. Also it can diversify most of this risk (i.e. to offset the probability of loss) by aggregating low correlated risks within a line of business, or/and between lines of business, or/and between risk categories, but also between legal entities and between countries. One of the well-known examples of diversification effect between risks is given by the case of mortality and longevity risk in life underwriting.

However, risk pooling and diversification only mitigate but do not eliminate underwriting risk. And even if the role of insurance companies is to bear risk, this requires capital which is both costly and scarce. As a result, there must be for each company a deliberate decision from the management about

which level of risk to bear. This conscious decision induces a need to transfer part of the extra risk externally.

Hence, insurers use risk transfer and mitigation techniques. One of them is traditional reinsurance by contracting with a reinsurer. For many companies this is still today the predominant means. For traditional insurance risks (longevity, natural catastrophes, deviation of reserves...) this is still the most readily available option. Another technique is securitisation. This is financially equivalent to a basic reinsurance mechanism where investors play the role of the reinsurer. Insurance-linked securitisation is a quite new market which started successfully its development with the securitisation of natural catastrophes exposures ("cat bonds") but struggled to develop on other underlying risks despite a few tentatives. As an issuer, AXA has been a pioneer on such instruments. Another option is to have recourse to derivatives. This is the most common technique for financial risks.

Insurance companies conduct a business that lives through different phases. First, they underwrite risks by issuing insurance policies, based on an assessment of the risks (e.g. property, casualty, health, death, longevity, investment, etc.) and the exposures of potential clients. When the insurer accepts the risk, the policy is priced according to the coverage that is granted to the client, who pays a premium to the company. Then, they invest the premium so that funds are available to pay claims on a timely basis.

From a financial perspective, insurers perform an intermediary function. The policies that property-casualty or health companies sell generate technical liabilities funded by the premium flow. Life insurers collect premiums and savings by issuing various types of products (cash value life insurance, annuities, and guaranteed investment contracts). The premiums are invested primarily in traded bonds (both sovereign and corporate), equities, and real estate.

This intermediate function gives rise to the need for asset liability management (ALM), because the cash flows of the liabilities issued by insurers have different patterns and characteristics than the cash flows of the assets they invest in. These ALM techniques match *inter alia* duration, currency and liquidity on both sides of the balance sheet.

An appropriate and skilful asset liability management will provide a given insurer with a competitive advantage. Indeed, it will allow him to create an asset portfolio which delivers the promised policy cash flows responding to the specific needs of particular policyholders while optimising the return of its portfolio without exposing either policy holders or shareholders to unacceptable levels of risk.

Central to asset-liability management are the management of the duration and the convexity of both assets and liabilities and currency matching.

2| DERIVATIVES ARE ESSENTIAL INSTRUMENTS FOR INSURERS TO HEDGE THEIR RISKS

Derivatives are a fundamental element of any insurer’s risk management toolbox. For the most part, indeed, insurers use derivatives for hedging. They have to hedge various risks stemming from both sides of the balance sheet: interest rate, foreign exchange, credit, equity, inflation, volatility, longevity (even if the last is far from being a deep and liquid market).

The simplest way to manage duration and convexity is to match asset and liability cash flows or to structure asset portfolios so that the durations of assets and liabilities are matched (“portfolio immunisation”). When done only with physical assets (mainly bonds), this has one major drawback: tailor-made and dynamic matching is impossible because the maturities of the available and most liquid bonds do not match the moving pattern of cash flows and thus it involves a lot of trading. Derivatives provide a cheaper and/or more flexible way to manage duration and convexity risk through the purchase and/or the sale of various combinations of derivative contracts, such as swaps, calls and puts. But it may have unintended accounting consequences (see below).

Derivative strategies are indeed usually both more flexible and quicker, sometimes even less costly, to implement than trading physical assets. They allow reshaping the ALM profile more accurately because they allow customised solutions (e.g. hedge of tail events, mitigation of long maturity risks, coping with non-linear behaviours...).

Derivatives are sometimes used as well as an alternative way to gain exposure to certain asset classes through «synthetic positions», such as for example, holding cash and equity futures instead of physical equities. Another example is the recourse to government bonds and credit default swaps (CDSs) as a synthetic position and an alternative to the direct purchase of a corporate bond. The counterparty risk is the same but the liquidity is much higher and an excess return can be captured for the same risk level. Besides, the use of derivatives allows for an optimisation of the yield through moderate investment in more risky investments, while not jeopardising the key ALM objective.

The changes in the market as well as the regulatory environment have led insurers to explore new techniques for managing their asset and liability risk. Thanks to the rapid growth of financial derivatives market over the past decades, there is today a wide variety of contracts to manage many types of financial exposures. The contracts range from standardised derivatives that are traded on organised exchanges to individually tailored, OTC contracts.

3| INSURERS BEAR SOME SPECIFICITY COMPARED TO OTHER MARKETS’ PARTICIPANTS

First, as underlined before, the purpose of an insurer who has recourse to derivatives is mostly hedging; derivatives can also be used for return enhancement as it provides synthetic exposure to certain asset classes; derivatives are not used for short term speculation.

Second, structurally, insurance companies do not take leveraged positions in this context, unlike other investors such as banks or hedge funds. Indeed, they don’t need leverage because liquidity is not such an issue as they receive premiums before paying claims. In most companies, internal risk management guidelines prohibit leverage. Besides, most local or regional jurisdictions do not allow leverage, either explicitly or as a consequence of an overarching principle according to which, to support insurance liabilities, they require assets which exhibit sufficient strength, liquidity and matching. Asset liability management in large insurance

companies has been looking at financial risks from an economic perspective, encompassing off balance sheet commitments for a number of years now. The risk tolerance and appetite in most insurance companies would not allow any leveraged position. Finally, for European Union companies, Solvency II (see below) will force a risk based approach to the solvency requirements of insurance companies. Under Solvency II, any leveraged position would automatically require an unbearable level of capital. This is crucial to bear in mind when it comes to the design of new regulation of those markets and to the different participants.

4 | DERIVATIVE INSTRUMENTS FOR AN INSURER LIKE AXA: FIGURES AND PROCESSES

Economic hedging strategies are defined and managed by AXA's local operations. Such economic

hedging strategies include (i) managing interest-rate exposures on fixed maturity investments, long-term debt and guaranteed interest rates on insurance contracts, (ii) managing foreign-currency exposures on foreign-currency denominated investments and liabilities, and (iii) managing liquidity positions (including the ability to pay benefits and claims when due) in connection with asset-liability management and local regulatory requirements for insurance and banking operations, (iv) limiting credit risk with regard to certain investments in corporate debt instruments and (v) managing equity and inflation risk. Derivatives have also enabled, when liquidity was available, to mitigate the Real Estate risk.

As at end 2009, the notional amount of all derivative instruments for the group totaled EUR 308 billion.

While the notional amount is the most commonly used measure of volume in the derivatives market, it is not used as a measure of risk because the notional amount greatly exceeds the possible credit and market loss that could arise from such transactions.

Box 1

How does AXA manage risks in derivatives?

In terms of **governance**, derivative strategies are systematically reviewed and validated by local ALM committees in the same way as any other ALM or investment strategies.

The **market risk** arising from derivatives is regularly monitored in multiple processes: (i) risk appetite process, in which the market risk position is continuously monitored, separating the impact of physical investments and derivatives; (ii) Solvency II process, in which the sensitivity of AXA to financial risk factors is monitored, also separating the impact of physical investments and derivatives; (iii) this monitoring ensures that there is **no leverage** arising from derivatives.

Legal risk is addressed by defining a standardised master agreement which AXA business units must use to trade derivatives. This standardised agreement ensures that AXA's policy is consistent across the AXA Group and that all business units experience an appropriate level of legal protection when trading derivatives.

There is a centralised **counterparty risk** policy. Group Risk Management has established Group-wide rules on authorised counterparties, minimum requirements regarding collateral, counterparty exposure limits. In particular, our **collateral process** allows reducing the credit risk arising from OTC derivatives at a limited level compared to the total value of derivatives in position.

The **operational risk** related to derivatives is measured and managed in the context of AXA's global operational risk framework. Furthermore, four centres of expertise have been selected to centralise execution of derivatives and reduce operational risk.

The **valuations** are also a key element of the Derivatives Management. AXA entities rely on the Derivatives Platforms of the Group (located in AXA IM and Alliance Bernstein) to independently counter-valuate the derivatives positions so as to get comfort on the accounting but as well on the prices proposed by counterparties in case the AXA entity wished to early terminate or restructure the derivatives. This pricing capability requires deep technical knowledge which has to stay updated and to follow market developments for new derivatives instruments usage.

The AXA Group is exposed to credit risk in respect of its counterparties to the derivative instruments, but is not exposed to credit risk on the entire notional amounts. AXA actively manages counterparty risk generated by OTC derivatives through a specific Group-wide policy. This policy includes a limit framework and an exposure monitoring process. Limits are set specifically for each authorised counterparty, based on an internal scoring system. This policy also includes daily to weekly collateralisation for the majority of the Group's exposure. Appropriate collateralisation reduces counterparty risk to very small amounts.

As at end 2009 and based on notional amounts, (i) 48% of the derivative instruments used consisted in swap contracts, (ii) 27% were option products, mainly caps, floors and swaptions, (iii) 15% were futures and forwards, mainly other than foreign currency products, and (iv) 10% were credit derivatives. Credit derivatives are mainly used as an alternative to corporate debt security portfolios, when coupled with government debt instruments, but also as a protection on single corporate names or specific portfolios. In 2009, the Group bought EUR 4.4 billion in CDS protection used for negative basis trades. This strategy consisted in purchasing (i) corporate debt instruments and (ii) CDS on the same issuer, maturity and seniority so as to lock associated liquidity premium.

- **Swaps:** AXA primarily uses (i) interest-rate swap contracts to manage cash flows arising from interest received or paid, and (ii) cross-currency swap contracts to manage foreign-currency denominated cash flows or investments. At end 2009, interest-rate swaps accounted for 65% of all swaps used by AXA. Currency swaps constitute another part of AXA's hedging strategies to manage foreign currency cash flow exposures. Equity swaps can also be used to hedge single equities exposure.

- **Options:** the option portfolio consists mainly of caps and floors and swaptions. Interest rate caps and floors are options agreements where the seller agrees to pay the counterparty an amount equal to the difference, based on a notional amount, between the interest rate of the specified index and the interest rate cap or floor. These products are used to hedge against interest rate increases (caps) or decreases (floor). Caps and floors are used predominantly in

some entities Life & Savings operations to protect their ability to serve policyholder participation and credited rate mainly for general account products with guaranteed minimum rates of return. They are used as well to anticipate the change in lapses and surrenders when interest rates move. Some customers tend to lapse when interest rates increase in order to reinvest into new products with higher guarantees. Conversely, surrenders tend to reduce when interest rates drop as the guarantees get more value for the customer. This induces a convexity of our interest rate exposure which is captured through our dynamic lapse assumptions and that such options help to match. The notional amount of caps and floors at end 2009 was EUR 44 billion or 53% of the total notional amount of all options. Swaptions represented 18% (EUR 15,082 million notional at end 2009) of the total notional amount of options as at end 2009.

- **Futures and forwards:** on a consolidated basis, the notional amount of futures and forwards at end 2009 was EUR 45 billion. Currency future and forward contracts accounted for 70% of these instruments.

- **Credit derivatives:** AXA, as part of its investment and credit risk management activities, may use strategies that involve credit derivatives (CDSs), which are mainly used as an alternative to corporate debt instruments portfolios, when coupled with government debt, instruments, but also as a protection on single corporate names or specific portfolios. At end 2009, the notional amount of credit derivatives carried by the Group was EUR 32 billion (including EUR 7.5 billion held through CDOs).

- **Mortality derivatives:** on November 13, 2006, AXA announced a EUR 1 billion pluri-annual shelf program to transfer mortality risk to the capital markets, of which approximately EUR 345 million (converted at the transaction date) was invested in 2006. This risk transfer was a securitisation of over-mortality risk in three countries in which AXA operates and resulted in a derivative contract between AXA and a special purpose vehicle named Osiris Capital plc. The securitisation and the attached derivative were redeemed on January 15, 2010.

In all cases, derivatives are strictly limited and monitored to avoid any leverage.

5 | THE USE OF DERIVATIVES WITHIN SOLVENCY II

Solvency II is the new solvency regime that will apply to all European Union insurers (pension funds are outside of the scope), normally by 2013. It provides for an economic risk based assessment of the Solvency Capital Requirement (SCR). It uses transparent and cutting edge actuarial methodology. More specifically, with regard to risk and asset liability management, Solvency II rewards economic diversification between lines of business, geographical regions and recognises new risk transfer and mitigation techniques like securitisation, reinsurance pooling, and hedging programs.

One can understand why Solvency II will encourage insurers to better manage and mitigate financial risk via actual reduction (divestment), dynamic hedging and also static hedging, using derivatives.

For risks with no evident risk premium, one can expect to observe strong reductions or dynamic hedges. These risks typically comprise interest rate risk, foreign exchange, realised volatility, where insurers will tend to match their liabilities. In particular, reducing implied volatility risk means hedging the options and guarantees embedded in insurance liabilities, which will be new for most of insurance companies.

However, for risky assets which can demonstrate an expected risk premium, insurers will at least want to hedge tail risk including with the use of derivatives. For equity, one can expect actual reduction or implementation of static hedges (e.g. out of the money – OTM puts). For alternatives, one can expect divestment or dynamic strategies (e.g. constant proportion portfolio insurance – CPPI)

Overall, we can expect an increase in derivative hedging. Some customised low capital strategies based on derivatives also emerge to capture tactical opportunities linked to the liquidity premium monetisation (e.g. negative basis trades).

A major challenge for insurers will be to implement all these strategies while minimising IFRS profit and loss (P&L) volatility. Currently, the notion of hedge accounting within the IAS 39 framework applies to

a very small portion only of the derivatives used by the insurers. Changes in hedged underlying assets valued at fair value through other comprehensive income (OCI, available-for-sale (AFS) category) are not offset by changes in derivatives valued at fair value through P&L. Changes would be offset by natural hedge only if assets and liabilities were valued at fair value through P&L.

With Solvency II, which values all assets and liabilities at fair value, there is no need for specific hedge accounting. Indeed, all changes in fair value of underlying hedged items will be covered by natural hedges.

IFRS 4 phase II will also allow for natural hedging because all assets and liabilities are valued at fair value through P&L. However, to avoid too high volatility in the measurement of performance, it would be timely to keep the possibility to book changes through OCI and recycle loss or gain through P&L when realised. The upcoming application of IFRS9 with a broader use of cost for debt instruments requires a revision of hedge accounting provisions.

6 | THE CRISES EVIDENCED THE NEED FOR DERIVATIVE INSTRUMENTS

Management of derivatives revealed significant improvement needs. But derivatives passed the crisis test. Indeed, Lehman Brothers was a major participant in derivatives markets. Its excessive leverage and failing risk management partly explained its collapse. However, Lehman's default prompted massive terminations of transactions and massive replacement trades implementations (renewals of transactions that had disappeared), without major disruption.

When traded on liquid markets or when robust secondary market clauses have been negotiated, derivatives can be managed in a sound way, as they do not add any counterparty credit risk thanks to several mechanisms: collateralisation with a low threshold, systematic margin calls, standardised and robust documentation (International swaps and derivatives association – ISDA, credit support annex – CSA...). Besides, it does not necessitate any liquidity other than to pay margin calls.

For these reasons, one should resist the temptation of demonising derivatives. They are necessary in a world where accounting is based on mark-to-market and regulation on limits to value-at-risk. They provide a certain level of security. There is clearly room for improvements though, as evidenced by the crisis.

7 | THE CRISIS ALSO REVEALED THE NEED FOR BETTER REGULATION

The list of mismanaged derivatives with huge consequences is long: Barings, AIG, Orange county... Any regulation should ensure both financial stability and level playing field, notably with a comprehensive and consistent coverage to avoid regulatory arbitrage strategies that have very dire consequences.

Solvency II provides a good regime even if it does not have a comprehensive scope (e.g. pension funds are outside the scope). It sets up an economic approach of risks; it is market-consistent based. It is a useful tool to detect ill-advised practices such as leverage and speculation. However, any effective regulation cannot apply to one category of market participants and/or one region only.

As a user, we support the initiatives that aim at making derivatives safer, while fully recognising that credit default swaps, interest rate swaps, foreign exchange, equities and commodities derivative markets are very different in nature and design and that different approaches are required for each asset class.

Key for the success of any reform will be the close coordination among authorities over the globe to ensure similar appropriate regulatory requirements, harmonise reporting and data requirements, set global standards for domestic infrastructure solutions to global markets.

In the aftermath of the crisis, a lot of thinking has been given to market infrastructures improvements and proposals have been publicly put forward. In particular, central counterparties (CCPs) are being put forth as the way to make OTC derivatives markets safer and sounder, and to help mitigate, if not suppress, systemic risk.

Indeed, if soundly run and properly regulated, CCPs can reduce the counterparty risk among OTC derivatives market participants. It can also net transactions across multiple counterparties. Finally, it can ensure that payments to others occur when a

Box 2

Some examples of welcome improvement measures of the OTC market infrastructure

Beyond CCPs, OTC market infrastructure can be improved on several grounds:

Interest rate swaps: extend the scope of products cleared in terms of currencies included and maturity, basis trades and cross-currency trades; extend direct participation in Swap Clear consistent with stringent membership criteria to ensure robustness in member default; offer clearing services to clients of General Clearing members; continue to expand the use of electronic confirmation; build out a trade repository, equally accessible by regulators globally;

Foreign exchange: broaden continuous linked settlement (CLS) uptake by expanding the set of currencies covered, the range of participants that can connect to it; and expanding the settlement cycle;

Equities: encourage legal uniformity of standard contractual documentation across EU countries; encourage consistent treatment of corporate actions by different European exchanges; increase electronic confirmation; strengthening bilateral clearing arrangements;

Credit default swaps: extend the scope of products cleared; extend direct participation in CCPs; offer clearing services to clients of General Clearing members; encourage trade date matching and reduce manual confirmations; increase use of central settlement; novation consent achieving legal confirmation.

counterparty defaults. Nevertheless, it concentrates the counterparty and operational risk associated with the CCP itself. This will therefore require top risk management practices from existing CCPs, coordination among regulators and supervisors on a global basis. Finally, contingency plans should also be coordinated to ensure that the financial failure of a CCP does not lead to systemic disruptions in associated markets. All in all, these initiatives are very much welcome as they should help facilitate credit risk management and reduce systemic risk, but current proposals are not perfect, notably the fact that each type of derivative would be treated separately.

Clearing initiatives in the industry are currently being contemplated, in credit default swaps, interest rate swaps, equity derivatives and foreign exchange.

However, it is worth bearing in mind that sound derivatives markets do not only need better regulation. They also need to be deep and liquid with notably an active competition among banks, which are the main providers for liquidity in those markets. Liquidity and depth of the markets are necessary for end investors as insurance companies; it is therefore necessary that the new contemplated regulations for banks allow them to play their role on those markets with reasonable capital requirements. From this point of view, better regulations of derivatives markets will allow banks as well as end investors like insurance companies to better limit and monitor their risks.

8 | OTC CONTRACTS STILL PLAY AN INSTRUMENTAL ROLE FOR INSURERS

Although there is a clear need to promote more organised, central clearing, over-the-counter trading is necessary, as a complement to exchange trading.

Notably, insurance companies need to manage asset liability matching in a context where there is a wide variety of liabilities. By their very purpose, standardised and exchange traded derivative instruments can be useful only to a certain extent.

For instance, to hedge the risk arising from guaranteed interest rates or guaranteed surrenders requires customised exposure profiles with specific maturities or strike levels. It is very unlikely, not to say unrealistic, to envisage that such tailor made transactions could be traded on an organised market, where liquidity cannot be offered for all existing exposure profiles.

More broadly, reduced – or even no – liquidity on customised contracts is the main obstacle to trading only. It is for example typical for specific risks which are not often traded such as inflation or real estate. In such case, even if an exchange is organised around a range of "standardised" instruments, due to the low volumes, the bid-ask spread is too high to create an actual market.

Derivatives, while not new, have been one of the key innovations in the financial markets over the past few decades. Financial innovation, like any innovation be it in business or elsewhere, is an ongoing process. It reacts to changes, it aims at addressing existing and emerging needs in a new way, it ebbs and flows, it booms activities and sometimes it busts. However, we should bear in mind that, as Joseph A. Schumpeter wrote it more than 70 years ago, "innovation is the outstanding fact in the economic history" and "nothing can be more plain or even more trite common sense than the proposition that innovation...is at the center of practically all the phenomena, difficulties, and problems of economic life".¹ In that sense, financial stability is also about striking the right balance in the design of regulation between preventing reckless behaviours and satisfying the ultimate needs of the individuals. For an insurer, our interest in financial innovation, notably in derivatives, includes setting up the apparatus that will enable us to provide our clients with products and tools to give them this long-term perspective to invest, save and consume, which are ultimately the basic ingredients for growth.

¹ "Business Cycles", New York: McGraw-Hill, 87.

Credit default swaps and financial stability

RAMA CONT

CNRS, France, and Columbia University, New York

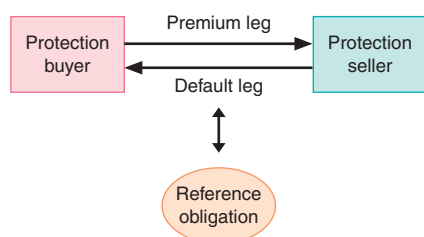
Credit default swaps (CDSs), initially intended as instruments for hedging and managing credit risk, have been pinpointed during the recent crisis as being detrimental to financial stability. We argue that the impact of credit default swap markets on financial stability crucially depends on clearing mechanisms and capital and liquidity requirements for large protection sellers. In particular, the culprits are not so much speculative or “naked” credit default swaps but inadequate risk management and supervision of protection sellers. When protection sellers are inadequately capitalised, OTC (over-the-counter) CDS markets may act as channels for contagion and systemic risk. On the other hand, a CDS market where all major dealers participate in a central clearing facility with adequate reserves can actually contribute to mitigating systemic risk. In the latter case, a key element is the risk management of the central counterparties, for which we outline some recommendations.

NB: The author thanks Marco Avellaneda, Darrell Duffie, Anne Duquerooy, Nadège Jassaud, Andreea Minca, Luc Riedweg, Manmohan Singh for comments and discussions on the topic of this note.

Credit default swaps, introduced in 1997 by JPMorgan, have become the most common form of credit derivative, totaling USD 64 trillion of notional value in 2008. With the onset of the financial crisis, this notional volume went down to around USD 38 trillion in the first half of 2009 but remains large. These are gross notional figures; according to BIS estimates, net exposure of major CDS dealers represents USD 2.9 trillion in June 2009.¹

Sometimes described in the press as "complex financial instruments", credit default swaps are, in fact, the simplest of all credit derivatives. A credit default swap (CDS) is a contract between two parties, the *protection buyer* and a *protection seller*, whereby the protection buyer is compensated for the loss generated by a *credit event* in a reference instrument. The credit event can be the default of the reference entity, lack of payment of a coupon or other corporate events defined in the contract. In return the protection buyer pays a premium, equal to an annual percentage X of the notional, to the protection seller. The premium X , quoted in basis points or percentage points of the notional, is called the CDS spread. This spread is paid (semi)annually or quarterly in arrears until either maturity is reached or default occurs, at which point the protection seller pays the protection buyer the face value of the reference asset minus its post-default market value, through physical or cash settlement. Thus, the protection buyer is protected against losses in case the reference entity defaults. If the buyer owns the reference security, the CDS acts as a hedge against default: such 'insurance against default' was the initial motivation for introducing credit default swaps.

Chart 1
Structure of cash flows in a credit default swap (CDS)



However, unlike insurance contracts, credit default swaps do not require exposure to the underlying credit risk: a CDS may be used to gain a synthetic exposure to the credit risk of a firm. Compared to the strategy of holding (or shorting) the corresponding bond, the CDS strategy leads to the same exposure but only requires a small amount of capital at inception, equal to the collateral or margin posted with the counterparty. Also, in instances where the underlying bond may be difficult to short, the credit default swap enables to take a speculative short position that benefits from a deterioration of the issuer's creditworthiness. The sheer volume of the CDS market indicates that a substantial portion of contracts are speculative; in principle, the outstanding notional of credit default swaps may even become larger than the total debt of the reference entity.

1 | A CONCENTRATED MARKET

Credit default swaps are over-the-counter (OTC) derivatives: they are not exchange-traded. The CDS market is a dealer market where a few major institutions control an overwhelming proportion of the volume and post quotes for protection premiums on various reference entities. The 10 largest dealers account for 90% of trading volume by gross notional amounts. Concentration is even higher in the US market, where the five biggest commercial banks account for more than 90% of gross notionals.¹ An estimated 30% of global activity is generated by JPMorgan alone.

This concentration reached a maximum with AIG. On September 30th 2008, the aggregate net notional amount of credit derivatives sold by AIG was USD 372 billion. This staggering amount was almost double the aggregate net notional amount sold by all other major dealers combined at the end of October 2008.¹ These high levels of concentration have raised legitimate concern among regulators about counterparty risk in the CDS market: in such a situation, the default of a major dealer may have a large impact on the rest of the market.

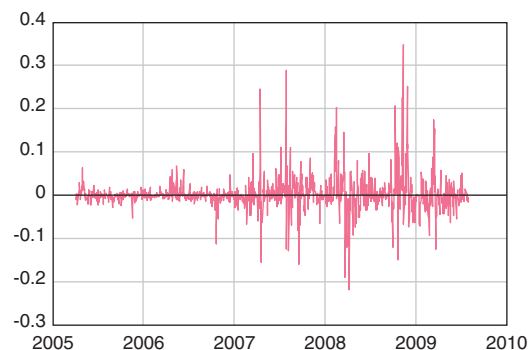
¹ See European central bank (2009).

Chart 2
Survival probabilities implied by CDS spreads
on Lehman Brothers on September 8, 2008

(X axis: years)



Chart 3
Daily returns of CDS spreads for CIGNA (CI), 2005-2010



Source: MarkIt Partners

2| CDS SPREADS AS SIGNALS ON CREDIT QUALITY

CDS markets have come to play an informational role in credit markets, where CDS spreads are widely regarded as a market consensus on the creditworthiness of the underlying – corporate or sovereign-entity. This is also reflected in the market practice of computing the *implied default probability* of an entity from its CDS spreads and using such default probabilities for the pricing of credit derivatives. Like implied volatility derived from option prices, such implied default probabilities do not necessarily contain any information about future defaults or the actual likelihood of the default of the reference entity, but simply convey a market consensus on the premium for default protection at various maturities. Chart 2 shows implied survival probabilities for Lehman Brothers implied from CDS quotes on September 8, 2008, shortly before Lehman's default. This example should temper any wild claims as to the "forward-looking" nature of the CDS spreads. Note also that the implied default probabilities and hazard rates depend on the assumption used for recovery rates, which are themselves subject to a large uncertainty. Nevertheless, CDS spreads are useful indicators of credit risk, especially in contexts where the underlying debt markets are less liquid.

3| RISK MANAGEMENT OF CDS POSITIONS

Day to day fluctuations in CDS spreads can be huge and tend to occur in sudden moves, usually associated with corporate events or macroeconomic news. Chart 3 shows the daily returns in the CDS spread of CIGNA Corp. from 2005 to 2009: note the large amplitude of daily returns, which can attain 40% especially on the upside. These large movements, which lead to "heavy tails" in the distribution of spread movements, are exacerbated by the relative *illiquidity* of many single name CDS contracts. Another concern is obviously the occurrence of the underlying credit event which results in large payouts, whose magnitude is linked to the recovery rate and difficult to determine in advance.

To provision for these risks, typically one or both parties to a CDS contract may post collateral and there may be margin calls requiring the posting of additional collateral during the lifetime of the contract, if the quoted spread of the CDS contract or the credit rating of one of the parties changes. Collateral has not been systematically required in OTC CDS transactions, and sudden deterioration of the underlying credit may generate large margin calls when the CDS spread undergoes a large move.

As with other OTC derivatives, credit default swaps are exposed to counterparty risk, which affects the level of CDS spreads. Counterparty risk exposure can be particularly large in a scenario where the protection seller and the underlying entity default together. This can happen for example if the protection seller has insufficient reserves to cover CDS payments. In this case, a protection buyer can incur substantial losses. The AIG fiasco in 2008 and the default of Lehman, a major CDS dealer, exacerbated the market perception of counterparty risk and distorted the level of CDS spreads in Fall 2008 and early 2009, stressing the importance of counterparty risk in the risk management of credit default swap portfolios. Concentration of the market on a few interconnected dealers amplifies the magnitude of this counterparty risk.

4| CDS MARKETS: CHANNELS FOR CONTAGION?

Credit default swaps have been repeatedly blamed for fomenting financial instability and generating systemic risk. The German financial authority BaFin, in its recent move to ban "naked" CDS trading, said CDS moves were jeopardising "the stability of the financial system as a whole".

Much of the blame has to do with the supposed role of speculative ("naked") credit default swaps in pushing up CDS spreads of entities in distress, thus making it harder for them to access the debt markets. Statesmen have been quoted as blaming CDS markets as responsible for the deterioration of their sovereign debt, the most recent example being Greece. Yet no empirical evidence has been offered to back such anecdotal claims. According to figures from the Depository Trust and Clearing Corporation (DTCC), CDS positions on Greece amounted to USD 9.2 billion (net) in March 2010, up from USD 7.4 billion in 2009, less than 2.5% of the Greek government bond market, which exceeds USD 400 billion. One might argue that it is a case of informational contagion, where CDS markets generate a panic in the debt market. In fact, in the case of Greece, CDS spreads have closely tracked bond spreads in 2010, showing no evidence of one leading the other in a significant way.

² See Cont and Minca (2010).

³ See Cont (2009).

Finally, there is no evidence that BaFin's May 2010 ban on 'naked CDS' has had any stabilising effect on the sovereign debt market.

A more serious concern is the counterparty risk generated by the default of large protection sellers, as exemplified by the failure of AIG (to pay margin calls on its CDS positions). In a concentrated dealer market such as the CDS market, the default of a dealer can affect many market participants and generate domino effects and default contagion. Network models² may be used to provide insights on such contagion effects in CDS markets. In presence of a CDS market, the default of an entity incurs losses not only for its counterparties but also for protection sellers in credit default swaps written on this entity. If a CDS protection seller has insufficient reserves to cover CDS liabilities, the underlying credit event also results in the default of the protection seller, thus widening the scope for contagion. Using a network-based measure of systemic risk³, Cont and Minca² show that a CDS market where protection sellers may lack liquidity for CDS default payments leads to an increase in default contagion and systemic risk.²

Interestingly, whether a CDS is 'speculative' or not is irrelevant here: this is determined by whether the *protection buyer* is exposed or not to the underlying bond, whereas counterparty default occurs if the *protection seller* lacks adequate reserves for paying the default leg of the CDS. A key issue therefore seems to be not the distinction between speculative and non-speculative CDS but the adequate management of counterparty risk in the CDS market.

5| CENTRAL CLEARING OF CREDIT DEFAULT SWAPS

Central counterparties (CCPs) have been proposed as a solution for mitigating counterparty risk and preventing default contagion in the CDS market. A clearinghouse (or central counterparty) acts as the buyer to every seller and seller to every buyer of protection, thereby isolating each participant from the default of other participants. Participants post collateral with the central counterparty and are subject to daily margin calls. This helps reduce losses in case of default

and mitigates counterparty risk. Also, management of collateral and margin calls by the CCP can help reduce operational risk in the CDS market.

A clearinghouse is not an exchange: prices are still negotiated over the counter and there is no auction mechanism for price fixing. However, for the purpose of marking positions and computing margins, clearinghouse participants are required to post quotes for all instruments being cleared, which leads to some degree of price transparency.

Currently CDS indices – CDX and ITRAXX – as well as their sub-indices (High Yield, High Vol) and single name constituents are being cleared by CCPs in the United States and Europe. ICE Trust, the largest clearinghouse for index and single name CDS, began operating in 2009 in the United States. Other clearinghouses for credit default swaps are CMDX, Eurex and LCH Clearnet.

6 | ENSURING THE STABILITY OF CCPs

Given their important role as a bulwark against counterparty risk and contagion, CCPs need to use stringent risk management procedures to ensure their own stability, including in stress scenarios when a large dealer may default.⁴ Risk management of central counterparties is currently done at several levels:⁵

- Screening and monitoring of the credit risks of clearing members through membership requirements, notably based on minimum capital requirements on members.
- Margin requirements are used to absorb short term losses and first losses in case of the default of a clearing member. The horizon over which losses are considered is related to the anticipated time frame necessary for unwinding a position in the market under consideration. For CDS markets this corresponds to a few days. Margin levels are adjusted daily through margin calls.
- Guaranty fund or clearing fund: large losses not covered by the margin are covered by a guaranty fund, to which clearing members contribute according to the

risk of their position. By mutualising extreme risks, the guaranty fund contributes to the overall stability of the clearinghouse and reduces systemic risk by immunising each member from the default of others.

Margin requirements should be designed to cover short term losses, which may arise from CDS spread volatility or from losses due to the default of the underlying reference entity of the CDS ("jump-to-default"). CDS spreads are observed to be highly volatile and exhibit large fluctuations (Chart 3 provides an example) and margin levels should account for this "heavy-tailed" nature of the risk.

Computing appropriate jump-to-default requirements for clearing members should be based on *loss given default*, not on *expected loss* as is often done in current OTC margin agreements. For a stand-alone 'naked' single name CDS, this would lead to a large collateral requirement, which would strongly discourage the protection seller. For a CDS *portfolio*, however, it may be feasible to require that the margin covers the loss given a fixed number of defaults in the portfolio over the risk horizon (usually a few days). Current practice by regulators is to consider as an extreme but plausible scenario 2 or 3 defaults over 3 days in an index of hundred names.

Whereas margin concerns the risk of each clearing members portfolio, the guaranty fund addressed systemic risk faced by the CCP. Guaranty fund requirements should not be viewed as an additional margin: the guaranty fund's main role should be to mutualise extreme losses in excess of margin. Such extreme losses typically occur in the event of the default of a clearing member and arise from the cost of liquidating its position. The level of the guaranty fund should be fixed in order to cover liquidation costs in extreme but plausible scenarios. Currently IOSCO and BIS recommendations require a CCP to dispose of sufficient funds to cover losses due to default of any single clearing member, but regulators have considered in practice two or more dealer defaults in some cases.

Central counterparties should stress test their risk management system in order to assess the adequacy of the level of margin and guaranty fund requirements. The outcome of the stress test largely depends on the configuration of portfolios of clearing members: a market where most clearing

⁴ See Bank for International Settlements (2004).

⁵ See Avellaneda, Cont and Zhang (2010).

members/dealers have are large net protection buyers or sellers represents a different risk than a market where most clearing members have well-balanced long-short portfolios. Therefore a meaningful stress test needs to consider different portfolio configurations for clearing members and identify (plausible) worst case scenarios from the viewpoint of the central counterparty's risk. Such a stress testing approach, has been proposed in Avellaneda *et al.*⁶ the idea is to simulate plausible portfolio configurations for clearing members and consider, across the simulated scenarios, the cost of liquidating each dealers portfolios in case of their default. This cost, net of margin, determines the risk posed by the dealer to the CCP and its allocation to the guaranty fund should be determined accordingly.

Interestingly, the results in Avellaneda *et al.*⁶ indicate that, in a clearing system where margin levels are set proportionally to the amplitude of short term losses of each member's portfolio, institutions whose default leads to the largest loss for the clearinghouse are those with well-balanced long/short positions with large notionals. As opposed to portfolios with large directional exposures, which result in a substantial margin requirement, such well-balanced portfolios will lead to smaller margin requirements thus the main part of the loss in case of liquidation flows to the guaranty fund. That such portfolios with low margin requirements may pose a large risk to the CCP, gives another reason why guaranty fund requirements should not be taken simply proportional to the margin level.

7 | IS CENTRAL CLEARING AN EFFICIENT SOLUTION?

Duffie and Zhu⁷ have argued that central clearing of a single class of OTC derivatives (such as credit default swaps) while leaving out other derivatives might be in fact inefficient in terms of the total amount of collateral required in the system. Similarly, Duffie and Zhu argue that having more than a single CCP is inefficient. The main argument is that hedging effects – for example between a bond position and a CDS hedging this bond position – which reduce collateral requirements in bilateral netting agreements, are not

taken into account when moving the CDS to a central clearing facility which does not clear the corresponding bond position. This argues in favor of a joint clearing of CDSs and fixed income instruments. Joint clearing experiments are in fact under way in the fixed income market, where cross-margining agreements have been recently implemented between clearing facilities for cash instruments and fixed income derivatives. Such cross margin agreements will certainly lead to more efficient allocation of collateral but their implementation is not trivial: margin requirements across CCPs need to be harmonised and procedures for the use of guaranty funds in the event of a default of a joint clearing member need to carefully thought out in order to provide the right incentives to clearing members and avoid loopholes.

The extent to which Duffie and Zhu's arguments apply to CDS markets depends on the (long/short) symmetry – or lack thereof – between positions of dealers in CDSs and other OTC instruments – mainly swaps and debt instruments – which would enter netting agreements between counterparties. In absence of symmetry between CDSs and other positions, it is not clear why bilateral netting would result in less collateral.⁸ Given that currently most dealers engage in 'index arbitrage' trades with long positions in CDS indices and short positions in the corresponding single name CDS, it seems that the major hedging effect to be accounted for is the hedge between a CDS index and its components. Some CDS clearinghouses, such as ICE Trust, already propose joint clearing of single name and index CDS ontracts, using a portfolio-based margining approach. This approach has the advantage of allocating lower collateral requirements to hedged positions, and encouraging dealers to clear a larger proportion of their CDS portfolios.

The analysis of Duffie and Zhu⁷ is based on the total amount of collateral, not on a measure of systemic risk, and notably excludes analysis of default scenarios. However, what differentiates credit default swaps from other OTC derivatives such as interest rate swaps is precisely the binary nature of their payoff: while the mark to market value of a CDS position prior to default may be a small fraction of its notional, the actual exposure it generates upon default of the reference entity may represent a large fraction of the notional. Failing to account for this

⁶ See Avellaneda, Cont and Zhang (2010).

⁷ See Duffie and Zhu (2009).

⁸ See Cont and Minca (2010).

jump-to-default risk leaves out the main component of the counterparty risk of a CDS. Using the Systemic Risk Index,^{9,10} a network-based measure of systemic risk defined as the expected loss to counterparties when an institution defaults, Cont and Minca¹¹ argue that a centrally cleared CDS market reduces the systemic impact of large financial institutions, provided all large CDS dealers are members of the clearinghouse (see Chart 4). Note that these seemingly opposite findings are not contradictory: different metrics (collateral, systemic risk) are being used.

Independently from the efficiency in terms of collateral requirements, regulators may have other reasons for supporting the creation of independent CCPs under their jurisdiction, with cross margin agreements across CCPs, rather than a single transnational CCP. Having several CCPs also mitigates the moral hazard issue of having to deal with a unique CCP which would then become "too interconnected to fail". In a situation with more than one CCP (which is the most likely outcome) it is extremely important for regulators to ensure that all CCPs are held to the same standards in terms of capital requirements and risk management: the contrary would lead to

regulatory arbitrage and concentration of risks in CCPs with lower margin and collateral requirements.

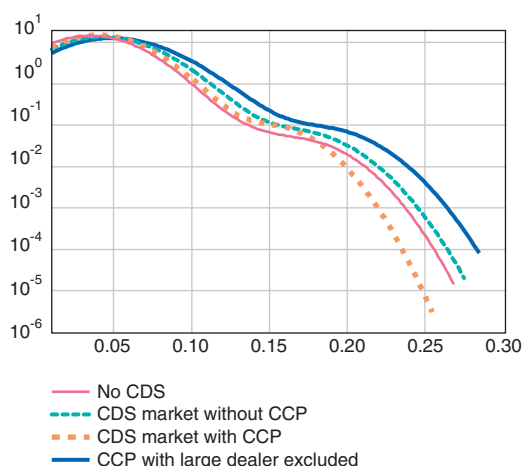
8| ENHANCING THE EFFECTIVENESS OF CENTRAL CLEARING

Central clearing is only effective if a sizable fraction of trades are cleared by the CCP. Given that central clearing has a cost in terms of collateral, some market participants may not be willing to use this facility. If regulators view central clearing as a desirable solution, they should provide incentives to make central clearing an attractive solution for market participants.

An approach which is being increasingly considered by many regulators is to make central clearing mandatory for standardised contracts. Although it sounds like a tough measure, we doubt it would have any serious impact other than encouraging the emergence of a new market for hybrid structured products, where credit default swaps will be camouflaged as default payment clauses in fixed income or currency derivatives where their risks may be yet harder to track. Yet we note that a wide array of derivatives have been successfully cleared by CCPs for over two decades, without any instance of mandatory clearing. A more effective approach would be to impose prudential penalties in the form of higher capital and liquidity requirements for contracts which are not centrally cleared. Currently such penalties exist but, in many cases, are lower than the actual cost of central clearing. To avoid regulatory arbitrage, such requirements should not be limited to standardised contracts but also extended to exotic structures. A positive development is the commitment, in September 2009, of several major derivatives dealers to submit specified proportions of their eligible CDS trades to a clearinghouse.

Chart 4
Distribution of the systemic risk index

(Y axis: proportion in network)



Note: Distribution of the systemic risk index⁹ of financial institutions in a market without CDS (pink), with bilateral CDS trades (green), and centrally cleared CDS (orange). A centrally cleared CDS market which excludes one or more large dealers may actually lead to higher systemic risk than a market with no CCP (blue).

Source: Cont and Minca (2010).

⁹ See Cont (2009).

¹⁰ See Cont and Moussa (2010).

¹¹ See Cont and Minca (2010).

9| TRANSPARENCY AND MONITORING OF SYSTEMIC RISK

Central clearing cannot be a universal solution for counterparty risk in CDS markets. A large portion of the CDS market is constituted of bespoke CDS contracts

which currently lack the standardisation and liquidity necessary for central clearing. Far from being anecdotic, such bespoke CDS contracts were in fact at the center of the AIG's failure. For such deals, even marking to market is an issue since there may be no reference market quote at a given time, leading to different views across counterparties on the level of margin calls. The CDS market has been dubbed one of the most opaque sectors of the financial market and there have been many calls for greater market transparency. There are two, very different, issues: transparency for the regulators and transparency for market participants.

Market transparency is, as always, a double-edged sword. A characteristic of the CDS market is the large degree of information asymmetry between a few dealers – who act as market makers – and other "buy-side" market participants. As in other dealer-based OTC markets, dealers make markets based on their information and would lose any incentive to do so in a situation of total transparency, where their information would cease to have any value, as in the classical analysis of Grossman and Stiglitz.¹² Not surprisingly, dealers have opposed exchange trading of CDS and a forced attempt to do so would simply reduce market activity. Private sector data providers such as MarkIt and data repositories such as DTCC have contributed to some degree of transparency in the CDS market, but their effectiveness is limited by the fact that participation of market participants is voluntary and not all trades are reported.

A totally different issue is the access of regulators to adequate information. To ensure adequate capital and liquidity requirements for large protection sellers, it is necessary to monitor large CDS exposures across

main market participants, especially in the financial and insurance sectors. In the past, regulators and market observers have mainly used indicators based on market data, such as CDS spreads and bond spreads for monitoring such risks in the market. However, given the lack of transparency in the CDS market, it is not safe to assume that market levels of CDS spreads adequately reflect counterparty risk. Indeed, market indicators failed to signal the systemic risk posed by AIG, simply because market participants were not aware of the huge exposures lurking behind the scene. This assertion does not necessarily contradict the assumption of market efficiency, since counterparty exposures are not public information hence need not be correctly reflected in CDS spreads.

DTCC provides aggregate net notional data for single reference entities and has recently expressed willingness to provide such information to regulators upon request. By requiring systematic reporting of trades to such trade repositories, regulators could improve the coverage of the repositories. But such data are not detailed enough in order to assess counterparty exposures, which correspond to exposures net of collateral. In particular, an accurate assessment of counterparty exposures requires knowledge not only of CDS positions but also of exposures in the underlying debt instruments. A step forward would be for regulators to systematically collect such counterparty exposure data. An operational solution, short of having data on all transactions, is to expand the coverage of trade repositories by requiring mandatory reporting by market participants, using this data for counterparty risk monitoring by regulators and requesting complementary reporting from market participants on a case by case basis.

We have argued that the impact of credit default swap markets can contribute either positively or negatively to financial stability depending on how counterparty risk is managed in these markets. Whereas an unregulated CDS market where protection sellers may lack sufficient resources in liquidity and capital may amplify contagion, a centrally cleared CDS market where all major dealers participate in multilateral clearing can actually reduce systemic risk and enhance the hedging function of credit default swap markets.

Central counterparties provide market-based solutions for mitigating counterparty risk. But central clearing cannot be generalised to all categories of credit default swaps: a large proportion of the market remains non-standardised and unfit for central clearing. In this context, an important step would be for regulators to collect reliable data on counterparty exposures across dealers; mandatory reporting of trades to trade repositories could be a first step. Such exposure data could then be used to monitor counterparty risk in the CDS market and set appropriate liquidity and capital requirements for protection sellers.

¹² Grossman and Stiglitz (1980).

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Credit default swaps

Financial innovation or financial dysfunction?

SATYAJIT DAS
Risk Consultant

CDS contracts were originally designed to transfer and disperse default risk within the capital markets to strengthen the resilience of financial institutions. The Global Financial Crisis has revealed that CDS contracts may not in fact achieve these objectives and may in fact increase the leverage within the system and also increase systemic risks in other ways. Documentary complexity, counterparty risk and increased concentration risk, brought about by CDS contracts, have contributed to the crisis and made it difficult to deal with key issues. CDS contracts may be presented as an important financial innovation, but actually are a major financial dysfunction and a cause of risk within financial system under certain circumstances.

Credit default swap (CDS) contracts and credit derivatives are complex and powerful financial instruments that frequently have unforeseen consequences for market participants and the financial system. As former New York Federal Reserve President Gerald Corrigan told policy-makers and financiers on 16 May, 2007: "Anyone who thinks they understand this stuff is living in lala land."

1| THE PROTECTION RACKET¹

In a typical CDS contract, the buyer of protection transfers the risk of default of a borrower (the reference entity) to a protection seller who for a fee indemnifies the protection buyer against credit losses. The buyer of protection is hedging the risk of default of the reference entity while the seller of protection is assuming the risk of default of the reference entity.

For the buyer of protection, the CDS contract avoids the need to transfer loans or bonds to hedge the credit risk of the issuer or borrower. This may be useful for illiquid bonds and especially loans, where it may be difficult to transfer the debt without the consent of the borrower. It allows disaggregation of key elements in hedging credit risk such as timing of the hedge, maturity of the hedge, currency in which the hedge is transacted and the pricing of the hedge. This increases flexibility in hedging credit risk. The documentation for CDS contracts is less expensive and less complicated relative to that needed for selling or transferring a loan. The transfer of the risk of a loan can be completed without disclosure to the ultimate borrower. This is possible as the loan is not sold or transferred but hedged through the separate CDS transaction.

For the seller of protection, the CDS contracts allows entities other than traditional financial institutions with lack of credit origination infrastructure to participate relatively easily in the credit market. The CDS contract, being off-balance sheet and unfunded, allows a seller of protection to take positions in credit markets on a leveraged basis; that is, without investing the full face value of the loan or bond.

The CDS contract facilitates short selling credit risk. This overcomes structural issues, such as the illiquid nature of the corporate bond repo market, that make it difficult, in practice, to short sell credit risk. The volume of CDS contracts is also unconstrained by the available amount of the reference entity's outstanding bonds and loans potentially increasing the overall liquidity of credit markets.

The CDS contract and the entire structured credit market were predicated originally on *hedging of credit risk*. Over time, the market has changed focus – in Mae West's words: "I used to be Snow White, but I drifted." The ability to short credit, leverage positions, and trade credit unrestricted by the size of the underlying debt market have become the dominant drivers of growth in the market for these instruments. At the market peak in volume around 2007, CDS volumes were estimated to be roughly three to four times volumes of underlying bonds or loans. This reflects increased interest amongst investors, such as hedge funds, in trading credit risk.

2| OUNCES OF PERFORMANCE

Where banks use CDS contracts to hedge credit risk, the key issue is whether the contract protects the banks from the underlying credit risk being hedged. As Mae West also noted: "An ounce of performance is worth pounds of promises". Documentation and counterparty risk means that the market may not function as participants and regulators hope if actual defaults occur.

Over time, CDS documentation has become highly standardised to facilitate trading. It generally does not exactly match the terms of the underlying credit risk (for example, the bond or loan) being hedged. A CDS contract is only likely to be a close hedge to another position in an offsetting CDS contract.

CDS contracts are also technically complex in relation to the identity of the entity being hedged, the events that are covered and how the CDS contract is to be settled. This means that the hedge may not provide, in practice, the protection sought. In fairness, all financial hedges display some degree of mismatch or "basis" risk.²

¹ For a more technical treatment of CDS contracts see Satyajit Das (2005).

² For a discussion of documentary issues in CDS contracts see Satyajit Das (2008 and 2009).

In 2009, the International Swap Dealers Association (ISDA), the industry lobby group with little regulatory or legal status, implemented the "hardwire" of the CDS contract, creating a Credit Determinations Committee (CDC) to deal with some of these issues. The CDC, made up of ISDA members, primarily dealers but now also including investors and other market participants, is charged with "determining" whether a credit event has occurred or a successor event has taken place and establishing the framework for settling contracts.

This curious development has real world consequences. In 2010, ISDA's American CDC voted that a bankruptcy credit event had occurred in respect of Ambac Assurance Corporation, which provided financial guarantee insurance for public and structured finance obligations. Interestingly, Ambac Assurance had not actually filed for bankruptcy protection. The insurer was seeking to restructure its operation. The credit event was classed as a 'bankruptcy' credit event, rather than alternatives such as 'restructuring' or 'failure to pay' due to complex provision of the CDS governing documentation. The case highlights the complexity and (sometimes) unintended consequences of CDS documentation, which moreover are poorly understood.

At the quantum level, the laws of classical physics bend in intriguing ways. In the case of CDS contracts, at the derivative level, the rules of finance also operate differently.

3 | WHO'S HEDGING WHOM?

CDS contracts substitute the risk of the protection seller for the risk of the loan or bond being hedged. If the seller of protection is unable to perform then the buyer obtains no protection.

In many cases, the CDS is marked-to-market daily and any gain or loss is covered by collateral (cash or high quality securities) to minimise performance risk. If there is a failure to meet a margin call then the position must be closed out and the collateral applied against the loss.

AIG's CDS contract were subject to the provision that if the firm was downgraded below AA- then the firm would have to post collateral. In October 2008, when AIG was downgraded below the nominated threshold, this triggered a collateral call rumoured to be around USD 14 billion. AIG did not have the cash to meet this call and ultimately required government support.

Current derivative market reform proposals requires standardised derivative transactions, including CDS contracts, to be cleared through the central counterparty (CCP). The CCP guarantees performance and manages the credit risk of derivative transactions. However, there are reasons to be cautious about the efficacy of the CCP.

The CCP risk management process requires liquid markets and reliable market prices that may not be available. Few derivatives will be capable of being marked-to-market against *actual* prices. For CDS contracts, it may be mark-to-model based on inputs that may be validated from market prices. For less traded reference entities, it will be a case of *mark-to-make-believe* or *mark-to-myself*. One market participant described quotes for CDS contracts in the following terms: "The business looks like the window of a Brezhnev-era Soviet butcher shop. Mouldy scraps hanging in the window. Old women lining up at 4am to try and buy credit protection on General Motors. What are reported as trades are really ways to establish prices to satisfy the auditors."³

CCP risk management relies on establishing a level of initial margin to secure performance. Margins will be based on historical price movements using value-at-risk and stress models that performed poorly during recent times. For CDS contracts that are triggered by defaults, unexpected and rapid deterioration in the credit condition of an entity can trigger large changes in value – known as "jump to default" risk. Such rapid changes in value are difficult to model and capture in risk management systems. If initial margins are too low, then the CCP is inadequately protected against counterparty default. Alternatively, the initial margin may be set too high creating disincentives for legitimate risk management activity.

3 See John Dizard (2008).

Where a margin payment is not met, the mechanics of closeout assume the ability to replace the defaulted contract with a new counterparty at current market prices in an active and liquid market. In the aftermath of the Lehman Brothers' bankruptcy filing, market liquidity diminished sharply and price volatility increased. It was practically difficult to replace CDS contracts. Market prices and valuations were significantly different from model valuations. It is not clear how these risks will be managed by the CCP.

In its December 2009 report "Reforming OTC derivative markets: a UK perspective", the UK Financial Services Authority (FSA) did not support *mandatory* clearing because "the clearing of all standardised derivatives could lead to a situation where a ...CCP... is required to clear a product it is not able to risk manage adequately, with the potential for serious difficulties in the event of a default."

4| FINANCIAL DYSFUNCTION

Financial innovation can offer economic benefits. CDS contracts may help complete markets, enhancing investment and borrowing opportunities, reducing transaction costs and allowing risk transfer. CDS contracts, where used for hedging, offers these advantages. Where not used for hedging, it is not clear how this assists in capital formation and enhancing efficiency of markets.

In providing the ability to transfer risk, CDS contracts may in turn encourage moral hazard in institutions encouraging them to take on more risk on the assumption that the additional risk will be transferred or hedged. It exposes firms to significant risk of losses from a breakdown in markets and also where the hedges do not work as intended due to either problems in the design of the hedge or counterparty risk.

It is generally assumed that speculative interest assists in enhancing liquidity and lowers trading costs. Where the liquidity comes from leveraged investors, the additional systemic risk from the activity of these entities has to be balanced against potential benefits.

Pricing of CDS contracts frequently does not accord with reasonable expected risk of default. The CDS prices,

in practice, incorporate substantial liquidity premia, compensation for volatility of credit spreads and other factors. CDS pricing also frequently does not align with pricing of other traded credit instruments such as bonds or loans.

The "negative basis trade" is predicated on pricing *inefficiency*. In a negative basis transaction commonly undertaken by investors including insurance companies, the investor purchases a bond issued by the reference entity and hedges the credit risk by buying protection on the issuer using a CDS contract. The transaction is designed to lock in a positive margin between the earnings on the bond and CDS fees. Negative basis trades exploit market inefficiencies in the pricing of credit risk between bond and CDS markets.

Benefits of CDS contracts must be balanced against any additional systemic risks from trading in these instruments. CDS contracts may amplify losses through leverage and increase credit risk within the financial system as well as change the risk of bankruptcy and affect the level of recoveries.

5| SEND ME A CHILD OF FIVE!

Discussions of "losses" always lead to arguments that approximate Groucho Marx: "A child of five would understand this. Send someone to fetch a child of five."

The derivative industry's indefatigable support of the market centres on the fact that all the CDS contracts related to the high profile defaults in the global financial crisis settled and the overall net settlement amounts were small.

Closer scrutiny suggests caution. In practice, until the implementation of the "hardwire" in 2009 there are actually two settlements. The "real" settlement where genuine hedgers and investors deliver bonds under the physical settlement rules (i.e. those who actually own bonds or loans and were hedging). Then there is the parallel universe where the dealers and large hedge funds settled via the auction. Dealers tend to have small net positions (large sold and bought protection but overall reasonably matched).

In the case of Lehman Brothers, the net settlement figure of USD 6 billion that is frequently quoted

refers to the second process. Real CDS losses from Lehman CDSs were higher, probably around USD 300-400 billion. Some banks and investors that had sold protection on Lehman's did not participate in the auction. They chose to take delivery of defaulted Lehman debt resulting in losses of almost the entire face value. For example, one German Landesbank reportedly took delivery of USD 1 billion of Lehman bonds that were worth USD 30 million at current market values.

CDS contracts did, in all probability, amplify losses in the credit market in recent defaults. For example, when Lehman Brothers defaulted the firm had around USD 600 billion in debt. This would have been the maximum loss to creditors in the case of default. According to market estimates, there were CDS contracts of around USD 400-500 billion where Lehman's was the reference entity. If used for hedging, then the CDS contracts would merely have resulted in the losses to creditors being transferred to the sellers of protection leaving the total loss unchanged. Market estimates suggest that only around USD 150 billion of the CDS contracts were hedges. The remaining USD 250-350 billion of CDS contracts were not hedging underlying debt. The losses on these CDS contracts (in excess of USD 200-300 billion) are additional to the USD 600 billion.

Proponents of CDS contracts argue that losses on additional "speculative" positions on Lehman as a reference entity are not a loss *per se*; that is, there are no "real" losses. Instead, the argument goes that they represent a transfer of payments from one counterparty to another – from the seller of protection to the buyer of protection. The idea is evident in a short essay by Michel de Montaigne entitled "That one man's profit is another's loss". Interestingly, if you follow that logic with Lehman's debt then nobody actually lost money either because somebody somewhere must have made it on the other side. Indeed, there have been *no losses* at all during the entire Global Financial Crisis as someone somewhere has made the offsetting gain.

The true issue is subtler – the CDS contracts amplified the losses as a result of the bankruptcy of Lehman's by (up to) approximately 50%. It increases the embedded leverage in the financial system to

a specific event namely the default of the reference entity. It also may absorb available liquidity and capital creating systemic issues.

6 | CHAIN LETTERS

The CDS market entails complex chains of risk similar to the re-insurance chains that proved so problematic in the case of the Lloyds market. The transfer of risk assumes that all parties along the potential chain perform their contracts. Any failure in the chain of risk transfer exposes other parties to the risk of insolvency and default. Defaults and failures in CDS contracts may quickly cause the financial system to become "gridlocked" as uncertainty about counterparty risks restricts normal trading. The bankruptcy of Lehman's set off a chain of just these events causing financial markets to become "frozen" in September and October 2008.

As in the re-insurance market, the long chain of CDS contracts may create unknown concentration risks. Derivatives markets generally may have higher concentration risk than considered desirable or acceptable. The CDS market is similar in structure to the overall derivative market with less than 10 dealers having the major share of the market. The potential impact of a bankruptcy filing by Bear Stearns and AIG on the OTC derivatives market, including CDS contracts, was probably one of the factors that influenced the Federal Reserve and US Treasury's decision to support the rescue of the two firms.

If the CDS contracts fail then "hedged" banks are exposed to losses on the underlying credit risk. One analyst suggested that losses from failure of CDS protection sellers to perform could total between USD 33 billion and USD 158 billion.⁴ Barclays Capital estimated that the failure of a dealer with USD 2 trillion in CDS contracts outstanding could potentially lead to losses of between USD 36 billion and USD 47 billion for counterparties. This underlines the potential concentration risks that are present.

CDS contracts may under certain circumstances create volatility and uncertainty instead of reducing

⁴ See Andrea Cicioni (2008).

risk. For example, the coupling of participants and long chains of risk transfer may mean that uncertainty about the financial position or solvency of any firm is quickly transmitted throughout the financial system rather than being confined to firms directly exposed to the distressed entity. Attempts to hedge this risk or close out positions may increase volatility. There are also negative feedback loops. If reference entities start to default then insurers, hedge funds and banks are affected. If the economic climate worsens and defaults rise then the overall ability to rely on these hedges may decline. The extent of the diversification of risk may diminish exactly when it is most needed.

7 | WAS IT GOOD FOR YOU TOO?

The documentation of CDS contract may also increase the risk of bankruptcy and impede debt restructuring that would limit losses from financial distress.

In 2008, CDS contracts on Federal National Mortgage Association (FNMA or Fannie Mae) and the Federal Home Loan Mortgage Corporation (FHLMC or Freddie Mac) were triggered as a result of the "conservatorship". This may seem odd given the government actions were specifically designed to allow Fannie and Freddie to continue fully honouring their obligations. However, "conservatorship" is specifically included within the definition of "bankruptcy" in the CDS contract resulting in a "technical" triggering of the contracts. This necessitated settlement of around USD 500 billion in CDS contracts with losses totaling USD 25 to USD 40 billion. The triggering of these contracts poses questions on the effectiveness of CDS contracts in transferring risk of default.

A study by Henry Hu and Bernard Black (from the University of Texas) identified the "empty creditor syndrome".⁵ This is where a lender who has bought protection on an underlying loan, bond or credit exposure may have an incentive to put the reference entity into bankruptcy or Chapter 11 *in order to be able to settle the contract*. This may be necessary as

the only way to trigger the CDS and capture the value of the credit insurance purchased.

CDS contracts might create incentives for creditors to push troubled companies into bankruptcy rather than seek to restructure debt to preserve the value of underlying assets. This may exacerbate losses in case of defaults. In fairness, ISDA's research challenges the "empty creditor syndrome" on both theoretical and empirical grounds.⁶

At a minimum, the CDS market may complicate restructuring of distressed loans, as all lenders do not have the same interest in ensuring the survival of the firm. A lender with purchased protection may seek to use the restructuring to trigger its CDS contracts.

CDS traders influenced the financing or restructuring of VNU, the multinational media business, GUS, the UK retail group, and Cablecom, a Dutch communications company. In February 2009, the US unit of LyondellBasell, the world's third-largest petrochemicals group that is in Chapter 11, secured a temporary restraining order and preliminary injunction against a group of creditors looking to enforce claims in a bid to trigger protection payments under their CDS contracts.

Conversely, the restructuring of MBIA avoided triggering CDS contracts on the firm through the use of reinsurance. The MBIA restructuring entailed the US municipal underwriting book being reinsured by a new entity – National Public Finance Guarantee Corporation (NPFGC). Reinsurance arrangements with Financial Guaranty Insurance Company (FGIC) were then ceded to NPFGC. NPFGC also issued second-to-pay policies to all policyholders covered by the assignment giving the beneficiaries a direct claim on the new entity and benefit from the credit quality of the new entity (that may be superior to the pre-existing MBIA). All other business of MBIA including structured finance exposures remains with MBIA.

The arrangements were designed in part to avoid triggering the CDS contracts under the "restructuring" credit event. They were also designed to avoid the succession provisions in the CDS contract that would have required existing CDS contracts where MBIA

⁵ See Henry T.C. Hu and Bernard Black (2008).

⁶ See David Mengle (2009).

was a reference entity to be split between MBIA and NPFGC. The effectiveness of the arrangements in not triggering the CDS contracts relies on highly technical readings of the contract.

The economic result of the arrangements is that MBIA retains the troubled structured finance exposures while losing the profitable and arguably less risky municipal re-insurance business. MBIA also reduces significantly the amount of capital it has available to support the exposures that remain with the firm.

MBIA was subsequently downgraded to non-investment grade. The downgrade reflected a reduction in MBIA's claim paying capacity, reduced capital, transfer of reserves associated with cession of its municipal portfolio and the continued deterioration in the insured portfolio of structured credit assets. This may materially increase the risk to sellers of protection in CDS contracts on MBIA.

The technical nature of the arrangements highlights the potential legal issues present in CDS contracts. Different legal forms of economically similar actions can lead to entirely different outcomes under the CDS contract complicating significantly the effects of the contract and its efficacy as a hedge.

8 | OBSERVING PROTOCOLS

In 2009, the CDS "big bang" and "hardwiring" process codified cash settlement of CDS contracts in case of a credit event. In cash settlement, the seller makes a payment to the buyer of protection intended to cover the loss suffered by the protection buyer based on the market price of a specific defaulted bond established through an "auction" system. The auction was designed by ISDA to be "robust" and "free of the risk of manipulation". The following highlights some of the issues in respect of the protocol and auction mechanism.

In Delphi, the protocol resulted in a settlement price of 63.38% (the market estimate of recovery by the lender). The protection buyer received 36.62% (100%-63.38%) or USD 3.662 million per USD 10 million CDS contract. Fitch Ratings assigned

a R6 recovery rating to Delphi's senior unsecured obligation equating to a 0-10% recovery band - far below the price established through the protocol.⁷ The buyer of protection depending on what was being hedged may have potentially received a payment on its hedge well below its actual losses - effectively it would not have been fully hedged.

Other cases highlight some of the issues in respect of the protocol and auction mechanism. The auction prices (effectively the recovery rates of the relevant bonds) in the settlement of CDSs on Fannie and Freddie were as follows:

- Fannie Mae – around 91.51% for senior debt and 99.90% for subordinated debt;
- Freddie Mac – around 94.00% for senior debt and 98.00% for subordinated debt.

Holders of subordinated debt rank behind senior debt holders and would generally be expected to suffer larger losses in bankruptcy. The lower payout on the subordinated debt probably resulted from subordinated protection buyers suffering in a short squeeze resulting in their contracts expiring virtually worthless. The differences in the payouts between the two entities are also puzzling given the fact that they are both under identical "conservatorship" arrangements and the ultimate risk in both cases is the US government.

In other CDS settlements using the auction, the payouts required from sellers of protection have been highly variable and (sometimes) large relative to historical default loss statistics. This may reflect poor economic conditions in the wake of the global financial crisis but are more likely driven by technical issues related to the CDS market.

Skewed payouts do not assist confidence in CDS contracts as a mechanism for hedging. In addition, the large payouts may place a material pressure on the price of underlying bonds and loans exacerbating broader credit problems. For example, the relatively low loan CDS recovery rates around 20-30% (high payouts on the loan CDS) may also lead to further pressures on leveraged loan prices and on transactions, such as collateralised loan obligations (CLOs) based on them.

⁷ See James Batterman and Eric Rosenthal (2005).

9 | POST MODERN CONTRADICTIONS

In recent years, the ability to trade credit, create different types of credit risk to trade, the ability to short credit and also take highly leveraged credit bets has become increasingly important. To some extent the CDS market has detached from the underlying "real" credit market. If defaults rise then the high leverage, inherent complexity and potential loss of liquidity of CDS contracts and structures based on them may cause problems.

The excesses of the CDS market are evident in the recent interest in contracts protecting against the default of a sovereign (known as sovereign CDSs). The specter of banks, some of whom have needed capital injections and liquidity support from governments to ensure their own survival, offering to insure other market participants against the risk of default of sovereign government (sometimes their own) is surreal.

The unpalatable reality that very few, self interested industry participants are prepared to admit is that much of what passed for financial innovation was specifically designed to conceal risk, obfuscate investors and reduce transparency. The process was entirely deliberate. Efficiency and transparency are not consistent with the high profit margins that are much sought after on Wall Street. Financial products need to be opaque and priced inefficiently to produce excessive profits or economic rents. Traders share Walter Bagehot's views about the English monarchy: "We must not let daylight in upon the magic".

In May 2006, Alan Greenspan, the former Chairman of the Fed, noted: "The CDS is probably

the most important instrument in finance. ... What CDS did is lay-off all the risk of highly leveraged institutions – and that's what banks are, highly leveraged – on stable American and international institutions." In October 2008, Alan Greenspan, the former Chairman of the Fed, acknowledged he was "partially" wrong to oppose regulation of CDSs. "Credit default swaps, I think, have serious problems associated with them," he admitted to a Congressional hearing. This from the man who on 30 July 1998, stated that: "Regulation of derivatives transactions that are privately negotiated by professionals is unnecessary."

On 6 March 2009 Bloomberg reported that Myron Scholes, the Nobel prize winning co-creator of the eponymous Black-Scholes-Merton option pricing model, observed that the derivative markets have stopped functioning and are creating problems in resolving the global financial crisis. Scholes was quoted as saying that: " [The] solution is really to blow up or burn the OTC market, the CDSs and swaps and structured products, and ... start over..." ISDA, the beleaguered derivatives industry group, predictably countered limply that: "... the notion that you would, as he said, blow up, the business in that way is just misguided."

Ludwig von Mises, the Austrian economist from the early part of the twentieth century, once noted: "It may be expedient for a man to heat the stove with his furniture; but he should not delude himself by believing that he has discovered a wonderful new method of heating his premises". In a thoroughly post-modern contradiction, CDS contracts, originally intended to reduce risk, may have, in fact, increased risk.

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Is there a case for banning short speculation in sovereign bond markets?

DARRELL DUFFIE
Graduate School of Business
Stanford University

I address whether speculation in credit default swaps is likely to have driven up Eurozone sovereign borrowing costs. I provide empirical evidence, based on research in progress with Zhipeng Zhang, that this is not the case. I also describe the role of speculators in credit default swap markets. I discuss how regulations that severely restrict speculation in credit default swap markets could have the unintended consequences of reducing market liquidity, raising trading execution costs for investors who are not speculating, and lowering the quality of information provided by credit default swap rates regarding the credit qualities of sovereign issuers. Regulations that severely restrict speculation in credit default swap markets could, as a result, increase sovereign borrowing costs. I briefly suggest alternative regulatory approaches.

NB: I am grateful for the use of results from ongoing research with Zhipeng Zhang, for research assistance from Haoxiang Zhu, and for conversations with Nadège Jassaud.

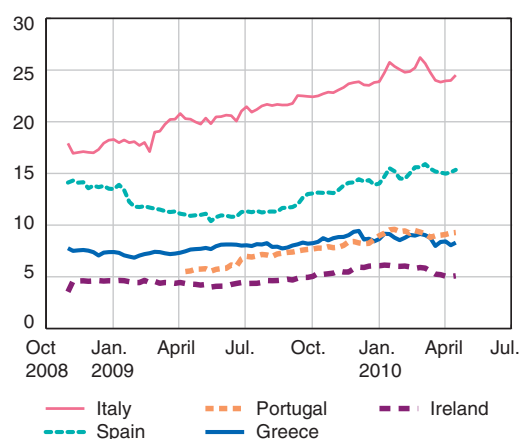
Many have raised concerns that speculation, particularly with credit default swap (CDS) contracts, is responsible for raising the borrowing costs of Greece and other issuers of government debt. Others have suggested that CDS speculation is destabilising. In the United States, significant recent attempts to ban the use of credit default swaps for speculating against the performance of borrowers include a provision in Waxman-Markey Climate Bill as well as the Dorgan amendment to the Senate financial reform bill. In Europe, investigations into the possible damage caused by CDS speculation have been set up by the European Commission and by Michel Barnier, the European Union's financial services commissioner. In May 2010, BaFin, Germany's financial regulator, banned speculation in Germany against European sovereign debt, whether through the use of credit default swaps or outright short bond positions. Well known economists, including Joseph Stiglitz and Richard Portes, have argued against allowing speculation with CDSs that a borrower will default.

Here, I will explain my view that banning speculation against borrowers, whether through credit default swaps or outright short bond positions, is not an effective approach to financial stability, and would likely result in thinner bond markets and poorer public information about a borrower's credit quality. This in turn could ultimately raise a borrower's interest expense.

First, though, I offer a quick review of terminology and background data. A credit default swap, or "CDS," is a derivative security. The buyer of protection pays an annual fee to the seller of protection, referencing a particular borrower such as Greece, and an amount of the borrower's debt. For example, if the agreed CDS rate is 5% and the amount of referenced debt is USD 100 million, then the annual protection fee is USD 5 million. In the event that the named borrower, say Greece, defaults on its debt, the seller of protection then gives the buyer of protection the difference between the referenced amount of debt and the market value of the defaulted debt. For example, if the referenced USD 100 million in debt defaults and as a result has a market value of only USD 30 million, then the buyer of protection would collect USD 70 million from the seller of protection. Credit default swaps are traded in the over-the-counter market. An investor who buys protection without owning a commensurate amount of debt instruments of the referenced borrower is said to have a "naked CDS."

Chart 1
Aggregate net outstanding CDS positions referencing Italy, Spain, Portugal, Greece, and Ireland

(Net CDS position in USD billions)

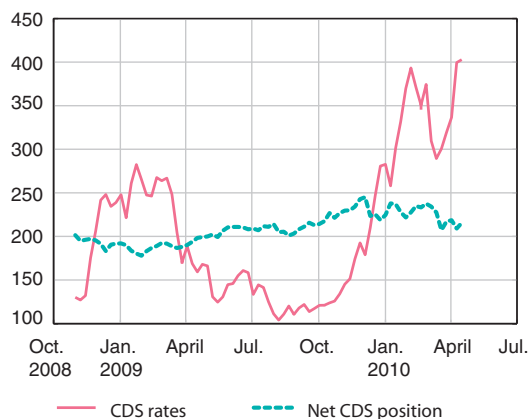


Source: DTCC

If an investor who has bought protection on USD 100 million of Greek sovereign bonds decides to reduce its position to USD 30 million, it would enter a new offsetting credit default swap, to sell protection on USD 70 million of Greek sovereign bonds. The net position of the investor is then USD 30 million. Since November 2008, the Depository Trust and Clearing Corporation (DTCC) has published the market aggregate of the net positions of CDS investors. Chart 1 shows these aggregate-market net CDS positions for five Eurozone countries whose indebtedness has been of concern: Italy, Spain, Portugal, Greece, and Ireland. Although these aggregate CDS positions have grown somewhat over the past eighteen months, the growth has not been especially volatile. Chart 2 shows, however, that the CDS rate for Greece has grown markedly in the past six months, in light of revelations about the true indebtedness of Greece, which had been obscured by reporting problems. The change in the CDS rate on Greek sovereign debt has served to alert investors that Greece may indeed have solvency concerns. Those CDS investors who first speculated that Greece had borrowed more than it could repay seem to have profited from this forecast. The recent decision of Greece to request special financing from Eurozone countries and the International Monetary Fund (IMF) was prompted by its difficulty in paying its debt.

Chart 2
Aggregate net CDS positions on Greece (DTCC data),
and the 5-year CDS rate on Greek sovereign debt

(CDS spreads, bps)



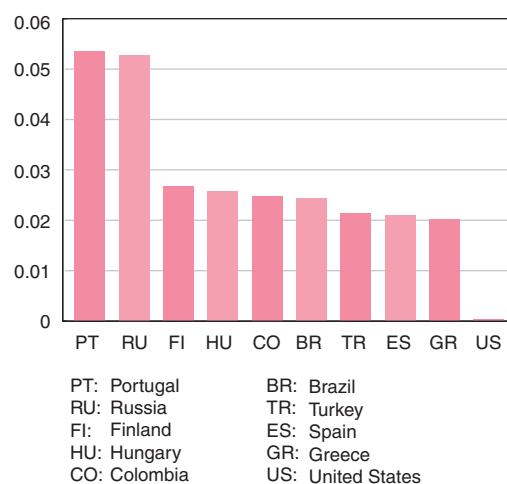
Sources: Bloomberg, DTCC.

Those favoring a ban of naked CDSs have taken one or more of the following positions:

- **Manipulation through demand-based price pressure.** By this line of argument, the CDS speculator could hope to buy so much CDS protection that the CDS rate rises. As a result, the CDS protection buyer could supposedly profit from the increased market value of the CDS position. In order to drive the CDS rate to high levels, the manipulator must pay a higher CDS rate than would apply in a "fair market." As a result, the manipulator intentionally pays too much, losing money relative to fair value, in hopes of more than offsetting this loss by cashing in once the price is high. As the manipulator sells what he has purchased, however, prices respond in the opposite direction. Profitable manipulation through price impact is difficult. Putting aside the difficulty of profiting from manipulation, achieving a sizable price impact would require CDS manipulators to take positions that are large relative to the amount of debt outstanding. In the case of the financially weaker Eurozone sovereigns, Portugal, Spain, Ireland, Italy and Greece, the aggregate net CDS positions shown in Chart 1 represent small fractions of their respective amounts of debt outstanding. With Greece, for example, the aggregate of the net CDS positions held in the entire market has remained well under 3% of the total amount of Greek debt outstanding. In every week since DTCC began reporting market-wide CDS positions in 2008, the increase in aggregate CDS protection bought against Greek

Chart 3
The ratio of aggregate CDS positions (DTCC data)
to national debt outstanding

(ratio of net CDS positions to government debt)



Sources: Bloomberg, DTCC.

sovereign debt was less than 0.18% of the total amount of Greek debt outstanding. That is, even if all CDS protection buyers in the market were manipulators, and had conspired to drive up CDS rates, they would have had only a marginal impact on the total amount of sovereign credit risk borne by bond owners and sellers of protection. Supply and demand for the sovereign's credit would cross at a new price that is relatively close to the "fair-market" (unmanipulated) price. In any case, based on research I am doing with Professor Zhipeng Zhang of Boston College, there is no significant empirical relationship between the amounts of credit default swaps referencing Greece, Italy, Ireland, Spain and Portugal, and the borrowing costs of these sovereigns.

- **Manipulation through misleading price information.** According to this view, CDS speculators could offer to pay so much for CDS protection against Greece that other investors would become unnecessarily alarmed at the prospects of a Greek default. As a result, the other investors would seek to reduce their exposures to Greece, causing the borrowing costs of Greece to increase, to the point that Greece would indeed enter default. The manipulators would, as a result, profit. For this to work, many manipulators would need to conspire to over-pay for CDS protection. The CDS rates reported by financial news services are based on

the rates offered by dealers, who would not wish to over-pay (unless they too were part of the supposed conspiracy). Such a conspiracy would be difficult to hold together; any one manipulator would prefer not to over-pay, and allow others to do so. A variant manipulation scheme would have the manipulator first short a large amount of the underlying bond, then over-pay for a small amount of CDS protection. If this particular CDS trade at a high rate is well noted and misleads bond investors to the point that the prices of bonds drop sharply, the manipulator could quickly exit both the bond and CDS position at a net profit, before better price information arrives in the market. Even if this scheme were successful, it seems unlikely to lead the sovereign toward default. The prices could be distorted for only a brief period.

- **No insurable interest.** By taking a naked CDS, an investor has effectively purchased insurance against an event (the borrower's default) without having an insurable interest. By analogy, this is like buying a life insurance policy on someone else's life, leaving the policy holder with an incentive to bring that person's life to an end (to put it politely). The holder of a naked CDS, likewise, would prefer that the borrower defaults. This argument has merit if the naked CDS holder is in a position to increase the borrower's likelihood of default. Because, as we have just discussed, the CDS speculator is probably unable to heavily influence how much a government will spend or save, the no-insurable-interest argument is not convincing to me. Greece had already borrowed far more than it could pay back before CDS rates rose significantly. Ironically, a greater moral hazard could arise if the protection buyer is hedging a significant loan to the referenced borrower. The lender would no longer be as concerned with monitoring the borrower's credit quality, and could even have an incentive to force the borrower into default prematurely in order to collect on the CDS protection. Hu and Black (2008) call this the "empty creditor" problem. The problem could be mitigated by the required disclosure of CDS positions of those investors holding a significant fraction of the referenced borrower's debt.

- **Instability.** The CDS market allows sovereign credit risk to be shifted more easily and quickly through the market. As a result, using CDSs, speculators can more easily get themselves over-leveraged and into difficulty. If they fail, they could cause losses for their counterparties, and general market instability.

Banning CDS speculation would make it more difficult for investors to take too much risk, and would make the market a safer place. Indeed, counterparty risk in the OTC derivatives market contributed to instability during the recent financial crisis. It is difficult to connect this line of argument to the borrowing costs of Greece or other sovereigns. There have been no reports of failures or instability among speculators shorting Greek or other sovereign CDSs. In any case, the best method of treating the financial instability caused by excessive risk taking in derivatives markets is to require higher collateral requirements, higher capital requirements for systemically important financial institutions, and greater use of central clearing, as discussed by Duffie, Li, and Lubke (2010). These and other pending reforms of the over-the-counter markets will improve the safety and soundness of these markets. Data repositories will eventually give regulators the opportunity to police those who would manipulate these markets, or would take positions whose risks are too large with respect to the capital backing them. Transactions price reporting would add additional transparency and improve market efficiency.

Regulations that severely restrict speculation in credit default swap markets could have the unintended consequences of reducing market liquidity, which raises trading execution costs for investors who are not speculating, and lowering the quality of information provided by credit default swap rates regarding the credit qualities of bond issuers. Regulations that severely restrict speculation in credit default swap markets could, as a result, increase sovereign borrowing costs somewhat. Diamond and Verrecchia (1987) provide theoretical support for the proposition that short-sales restrictions impede the revelation of fundamental information through market prices. In the case of equity markets, there is ample evidence that bans on short selling damage market quality. For example, Boehmer, Jones, and Zhang (2009) show that the short-sales ban imposed on a selection of equities during the financial crisis increased bid-ask spreads for these stocks, increased the sensitivity of their prices to supply shocks, and raised their volatility, relative to those stocks not subjected to the short-selling ban. Additional empirical evidence that short-sales restrictions harm market liquidity or price discovery is provided by Boehmer and Wu (2008), Chang, Cheng, and Yu (2007), and Saffi and Sigurdsson (2007). I am not aware of any empirical evidence that short-sales restrictions have improved the liquidity or price discovery role of a financial market.

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Over-the-counter derivative markets in India

Issues and perspectives

SHYAMALA GOPINATH

Deputy Governor
Reserve Bank of India

The present article tries to put in perspective the boundary conditions, imposed by the macroeconomic constraints, which have guided the evolution of over-the-counter (OTC) markets in India and underlines the point that the process of transiting from a predominantly OTC based model to an exchange-traded model needs to follow a calibrated path. Through this transition period, the overall regulatory approach towards OTC derivative markets is as important as addressing the transactional aspects.

In India, unlike the developed financial markets where OTC derivative markets epitomised complex, unregulated financial innovations that grew exponentially over the last two decades, the OTC derivative markets have evolved within a regulated space. The major elements of this regulatory framework include a broad specification of products to be permitted, nature of participants in the markets, distinct responsibilities for market makers and users for all OTC derivatives, effective reporting systems for capturing systemic information and focus on developing market infrastructure for post-trade clearing and settlement.

Given the above context, the OTC space in India for interest rate and forex derivatives will continue to operate within a regulated manner with increased transparency. New instruments for exchanges will be introduced in a gradual manner, as hitherto. Further areas for strengthening the functioning of OTC markets will include greater standardisation of OTC derivatives and extending central clearing arrangements for such contracts where feasible. Work has already been initiated for designing a centralised trade reporting system for all OTC derivatives for better systemic oversight and market transparency.

The over-the-counter (OTC) derivative markets, in particular credit derivatives, are now perceived as the weak link in the financial system that increased the systemic risk of contagion and exacerbated the financial crisis globally. Their complex and non-transparent nature coupled with a light-touch regulatory approach towards them resulted in excessive counterparty exposures and risk concentrations building up through the system. Naturally there has been a concerted effort globally to reform the OTC derivative markets, with much of the debate focusing on measures to address the issues of counterparty credit risk and non-transparency. The revised template for reforming these markets, as is being pursued in major jurisdictions, therefore broadly envisions greater standardisation of contracts to make them eligible for central clearing, tighter counterparty risk management norms and higher capital charges for all clearing-ineligible contracts and making these markets more transparent.

The OTC derivatives are generally considered superior to exchange-traded derivatives in their amenability to customisation to cater to specific risk management needs of clients. OTC markets are also best suited to test innovative products, let them stabilise and get refined, before these are considered suitable for wider offering through standardisation. However, the explosion in the OTC derivative volumes over the past decade globally has largely been a result of these markets moving out of the regulatory perimeter as part of a conscious policy stand. The regulation of financial markets in key developed markets was reinterpreted as being limited to regulation of the conduct of business aspect on exchange-traded markets, under the presumption that the risks in OTC derivative markets would best be addressed through entity regulation. As is now evident, this approach was found to be inadequate since the entity regulation itself relied heavily on banks' own risk management frameworks and more importantly, risks building up in the OTC space at the systemic level were lost sight of.

In contrast to the above, the predicament for countries such as India is qualitatively different from the developed countries in terms of the nature and evolution of the OTC derivative markets as well as the regulatory approach towards these markets.

1 | CONTEXTUAL CONSIDERATIONS

Exchange traded derivative markets, to be efficient and complete, require a certain set of policy framework for the underlying markets. Essentially what the exchange traded markets demand are friction-free underlying markets with no restrictions on taking long or short positions and a seamless integration between different segments enforced through free participation by all agents. In simple words, efficient exchange traded derivative markets and controls in the underlying market do not go together.

This is a fundamental challenge faced by the policy makers in economies where macroeconomic and structural constraints as well as financial stability considerations necessitate certain restrictions on the underlying markets. In the case of India, for instance, there are policy-imposed limitations on participation by various economic agents. There is still a requirement of an underlying exposure for undertaking forex derivative transactions. Most importantly, the real sector tolerance for high volatility in exchange rates as well as interest rates is limited and this makes policy interventions in the cash markets an additional variable to contend with.

While exchange traded derivative markets do not fit into this framework, whatever their operational benefits, OTC markets make it feasible to pursue market development in a gradual framework within the given constraints. This is precisely what has happened in India where OTC derivative markets have evolved to significant volumes.

It would be imperative to recognise the above considerations while chalking out the reform path for OTC derivative markets in India. The nuanced terms of the reform proposals will need to focus more on strengthening the OTC market framework instead of being embroiled with binary consideration of OTC *vis-a-vis* exchanges.

2 | EVOLUTION OF OTC DERIVATIVES

The financial derivative markets in India have evolved through a reform process over the last

two decades, witnessed in its growth in terms of size, product profile, nature of participants and the development of market infrastructure. At present, the following categories of derivatives are permitted:

	OTC	Exchange-traded
Rupee interest rate derivatives	Forward rate agreements, interest rate swaps	Interest rate futures
Foreign currency derivatives	Forwards, swaps, options	Currency futures
Equity derivatives		Index futures, index options, stock futures, stock options

The OTC derivative markets in India, unlike the developed financial markets where these markets epitomised complex, unregulated financial innovations, have evolved within a regulated space. The process of evolution needs to be seen in perspective of the boundary conditions imposed by the broader macroeconomic framework for the development of the financial sector.

The process of financial market reforms in India is less than two decades old. It was in March 1993 that a system of market-determined exchange rates was adopted by India as part of a broad set of structural reform measures. Gradually, financing the fiscal deficit transitioned from automatic monetisation to market-based borrowings resulting in a regular supply of marketable securities. With regard to exchange rate, it was in August 1994 that the rupee was made fully convertible on current account. These reforms allowed increased integration between domestic and international markets and created a need to manage interest rate and currency risks.

It was in the above backdrop that a menu of OTC products was introduced to enable the economic agents to manage their risks in an effective manner. Being a bank dominated system, it was natural that these products were offered through the OTC market with banks acting as intermediaries. On the forex side, apart from forwards, which were in existence for long, cross currency options not involving rupee, foreign currency-rupee options and swaps were permitted for customers who have foreign currency exposures. The fundamental requirement of

existence of an underlying commercial transaction for entering into a derivative, both on current or capital account, has remained through the years. The determination of underlying exposure is largely based on current exposure and past performance for trade related transactions. However, as an exception, borrowers having long-term Indian rupee (INR) borrowing were permitted to use foreign currency-INR swaps to transform these into a foreign exchange liability.

On the interest rate side, banks and primary dealers were allowed in 1999 to offer forward rate agreement (FRA) and rupee interest rate swaps (IRS) to corporates for hedging interest rate risk as also to deal in them for their own balance sheet hedging and trading purposes. The size of the OTC interest rate and forex derivative markets in India is given in the Annex.

In case of securitisation, a regulatory framework was put in place after a sizeable market had developed. The attempt was to standardise the differing practices being followed by banks and address certain concerns on accounting, valuation and capital treatment. One of the key provisions, among others, was to disallow upfront booking of profit/premium arising on account of sale and requiring it to be amortised over the life of the securities issued by the SPV. These measures went a long way in dis-incentivising some of the innovative structures that created problems elsewhere. Furthermore, in view of the pass-through nature of the securities linked to cash flows from the underlying assets, the risk of maturity mismatches is reduced.

Credit default swaps (CDSs) are currently not permitted and are in the process of being introduced to provide the participants an instrument to manage their credit risk. This is also expected to aid the development of the corporate bond market. The aftermath of the crisis provides an opportunity for countries such as India, which are starting on a clean slate, to address some of the negative features associated with the product through an appropriate framework design. It is proposed to start with plain vanilla single name CDSs on corporate bonds in the OTC market. The guidelines, to be placed in public domain would broadly emphasise on appropriate risk management framework, greater transparency

in CDS transactions and eventually providing a clearing framework.¹

From a systemic perspective, a key issue would be of induced volatility in the credit markets as a result of CDS markets. It is in this context that the issue of insurable interest becomes relevant. Permitting naked CDS may increase buildup of speculative positions across the system. It may also accentuate adverse incentives by encouraging leveraged credit exposures and impeding effective resolution process. However, prohibiting naked CDS would constrain market making in the product. The challenge would be to design a limit structure within which market making could be facilitated by regulated entities. Stipulating risk limits such as 'risky duration' / 'risky PV01'² of CDS portfolio may need to be considered.

In the exchange traded derivative space, a more liberal approach has been adopted and in the recent past. While currency futures and interest rate futures have already been introduced on exchanges, currency options on USD/INR are in the process of being introduced. While it is expected that these markets fulfil the genuine hedging requirements of the participants, it is not possible to replicate the discipline of ensuring underlying commercial transactions which is possible in the OTC market. Accordingly, the interest rate and currency futures markets operate in parallel with the OTC markets with different set of stipulations.

3 | REGULATORY FRAMEWORK FOR OTC DERIVATIVES

Explicit regulation of OTC derivatives in India has been a key element of the policy framework which has helped in preserving systemic stability. The responsibility for the regulation of all interest rate, forex and credit derivatives, including OTC derivatives, vests with the Reserve Bank of India (RBI). Legally, the RBI derives these powers from various statutes including the Reserve Bank of India Act, 1934, the Banking Regulation Act, 1949, the Foreign Exchange Management Act, 1999 and the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002.

The RBI Amendment Act, 2006, was a key milestone in explicitly laying down the regulatory framework for OTC interest rate, forex and credit derivatives. The box gives a brief background and provisions of this amendment.

Substantively also, regulation of these markets being with the RBI makes eminent sense. The underlying variables in these markets viz. interest rates and exchange rates have critical bearing on the macroeconomic management by the RBI and it is imperative that the regulation of these derivatives are aligned with the larger policy objectives of monetary and financial stability. Further, in all these markets banks are the dominant participants and the overarching role of the entity regulator for banks i.e. the RBI provides the requisite synergy.

The major elements of the regulatory framework for OTC derivatives include a broad specification of products to be permitted, nature of participants in the markets, distinct responsibilities for market makers and users for all OTC derivatives, effective reporting systems for capturing systemic information, governance and oversight and focus on developing market infrastructure for post-trade clearing and settlement. The underlying rationale for key stipulations is explained below.

- (i) ***There is a requirement that for an OTC derivative transaction to be legally valid, one of the parties to the transaction has to be a RBI regulated entity.*** This is to ensure that the entire OTC derivative market is within the regulatory perimeter. Prudential prescriptions for each class of participants may be decided by the respective regulator within the broad policy framework but it makes systemic monitoring possible.
- (ii) ***There is a clear distinction between the roles of market makers and users for all OTC derivatives.*** It is the market makers which function as risk transferors in the system. It is extremely important that these entities function in a totally transparent and regulated manner. Only banks and primary dealers in case of certain interest rate derivatives are permitted to act as market makers since extending this facility to all agents can result in risks building up on the balance sheets of such entities.

¹ Gopinath (S) (2010) : "Pursuit of complete markets – The missing perspectives", RBI Speeches, http://rbi.org.in/scripts/BS_SpeechesView.aspx?Id=480

² Risky PV01 represents the value change (Present Value Impact) of the CDS when the spread moves by 1 basis point.

Box 1**RBI Amendment Act, 2006**

In 1999, by the Securities Laws (Amendment) Act, 1999, section 18A was inserted in Securities Contracts (Regulation) Act, 1956 (SCRA) which reads as under:

"18A. Contracts in derivative – Notwithstanding anything contained in any other law for the time being in force, contracts in derivative shall be legal and valid if such contracts are

- (a) traded on a recognised stock exchange;*
- (b) settled on the clearing house of the recognised stock exchange,*
- (c) in accordance with the rules and bye-laws of such stock exchange."*

In view of the said section 18A of SCRA, a doubt was raised about the legality of OTC derivatives such as forward rate agreements and interest rate swaps permitted under RBI guidelines issued in July 1999. It was felt that these OTC derivatives could be deemed as wagering contracts and as such, void under section 30 of the Indian Contract Act, 1872 and not legally valid under section 18A of SCRA.

Recognising that OTC derivatives play a crucial role in reallocating and mitigating the risks of corporates, banks and financial institutions and that the ambiguity regarding the legal validity of OTC derivatives inhibits the growth and stability of the market for such derivatives, suitable amendments, effective January 9, 2007, were carried out to the Reserve Bank of India Act, 1934 (RBI Act).

Section 45V of RBI Act, 1934 (inserted by Reserve Bank of India (Amendment) Act, 2006) lays down that notwithstanding anything contained in SCRA or any other law for the time being in force, transactions in such derivatives, as may be specified by RBI from time to time, shall be valid, if at least one of the parties to the transaction is RBI, a scheduled bank, or such other agency falling under the regulatory purview of RBI under the RBI Act, the Banking Regulation Act, 1949, the Foreign Exchange Management Act, 1999, or any other Act or instrument having the force of law, as may be specified by RBI from time to time. It also provides that transactions in such derivatives, as had been specified by RBI from time to time, shall be deemed always to have been valid.

The Act further gives powers to the Reserve Bank under Section 45W to "...determine the policy relating to interest rates or interest rate products and give directions in that behalf to all agencies or any of them, dealing in securities, money market instruments, foreign exchange, derivatives, or other instruments of like nature as the Bank may specify from time to time." However, the directions shall not relate to "the procedure for execution or settlement of the trades" in respect of transactions on exchanges.

- (iii) ***The users, including financial entities, are permitted to transact in derivatives essentially to hedge an exposure to risk or a homogeneous group of assets and liabilities or transform an existing risk exposure.*** This stipulation is essentially to restrict speculative trading in derivatives by the real sector, whose primary economic interest in undertaking derivative transactions should be to hedge their exposures.
- (iv) ***Derivative structured products (i.e. combination of cash and generic derivative instruments) are permitted as long as they are a combination of two or more of the generic instruments permitted by RBI and do not contain any derivative as underlying.*** Structured products entail packaging of complex, exotic derivatives into structures that may lead to increased build-up of risks in the system. Some of these structures may simply be unsuitable for a large section of users given their complexity. Most importantly, if left unregulated, these structures may exploit the clear regulatory arbitrage by offering hidden payoffs that are otherwise not allowed on a standalone basis.
- (v) ***The responsibility for assessment of customer suitability and appropriateness is squarely on the market maker.*** There are a detailed set of requirements that the market maker needs to fulfill in this regard while selling any product to a user. As the recent experience in many countries shows, inappropriate understanding of complex derivatives by the buyers of these can have serious repercussions. The argument of *caveat emptor* does not really work in practice,

as many countries are realising on account of huge derivative losses. It is ultimately a systemic issue and it is important, in the interest of sellers of the products as well, that sufficient suitability assessment is done before selling the product.

- (vi) *All OTC forex and interest rate derivatives attract a much higher credit conversion factor (CCF) than prescribed under the Basel framework and all exposures are reckoned on a gross basis for capital adequacy purpose.*

The applicable CCFs were increased in 2008 since it was felt that the conversion factors prescribed under the Basel framework did not sufficiently capture the market volatility of underlying variables in the Indian context.

- (vii) *Exposures of banks to central counterparties (CCPs) attract a zero risk weight as per Basel norms. Additionally, collaterals kept by banks with the CCPs attract risk weights appropriate to the nature of the CCP* as reflected in the ratings under the Basel II Standardised Approach.

The latter was incorporated by RBI as CCPs cannot be considered risk free entities.

- (viii) *All permitted derivative transactions, including roll over, restructuring and novation are required to be contracted only at prevailing market rates.*

This ensures that non-market rates are not used to manipulate cash flows current and future.

- (ix) *There are regulations for participation by non-residents in derivative transactions.*

This basically flows from the capital account management framework which places certain restrictions for participation by non-resident investors in the forex and interest rate markets.³

4| CLEARING AND SETTLEMENT INFRASTRUCTURE FOR OTC DERIVATIVES

In India as early as in 2002, the Clearing Corporation of India Ltd (CCIL) commenced guaranteed settlement

of inter-bank spot forex transactions and all outright and repo transactions in government securities, whether negotiated or under order driven systems. CCIL has commenced non-guaranteed settlement of OTC trades in IRS/FRA in November 2008, covering over 75 per cent of the market turnover. CCIL also offers certain post-trade processing services like resetting interest rates and providing settlement values to the reporting members. Guaranteed settlement of these trades is expected soon. CCIL also acts as central counterparty for spot and forex forward trades.

With the enactment of the Payment and Settlement Systems Act, 2008, the Reserve Bank has the legislative authority to regulate and supervise payment and settlement systems in the country. The clearing and settlement facilities offered by CCIL are governed by the risk management processes which are assessed by the Reserve Bank through its offsite monitoring and onsite inspections. The margins with the CCIL are maintained in the form of cash and government bonds ensuring the quality and liquidity of the settlement guarantee fund.

5| TRANSPARENCY AND REPORTING

The aggregate trade data relating to all OTC derivatives is required to be reported by banks on a regular basis. On the forex side, while banks are required to report aggregate daily sales/purchases of forex forwards and swaps, data relating to options is collected on a weekly basis. Additionally, as part of regulatory reporting, banks report to the RBI product-wise notional principals of their outstanding derivative exposures on a monthly basis, indicating the bifurcation between trading book and banking book, and benchmark-wise details of interest rate swaps. They also report related credit risk exposure to their top ten counterparties each in the financial and non-financial sectors.

In the recent past, important initiatives have been taken to enhance reporting disaggregated trade data for OTC derivative transactions. A start was made in 2007 when all banks started reporting the inter-bank interest rate swap (IRS) trade data on-line to CCIL. The collection of client level trade data from banks

³ Foreign investment in rupee debt securities, both sovereign as well as corporate, is permitted only within prescribed limits. This follows from the broader capital account management framework which has favoured freer foreign investment in equity markets and a limited access in the debt markets. Non-residents are also not permitted to freely transact in forward markets; a limited window has been allowed to non-resident investors to hedge their currency risk in respect of their investments in India.

has also started on a weekly basis from October 2009. The traded price range and volume data on inter-bank trades is also being disseminated publicly for market transparency.

Going forward, a working Group is looking into the issue of a single point centralised comprehensive reporting of all OTC derivatives. The objective is two-fold: to make the reporting more meaningful for regulatory assessment as well as market transparency and to have a single-point reporting platform for all market transactions.

6 | ISSUES GOING FORWARD

Given the above context, the OTC market in India for interest rate, forex and credit derivatives will continue to operate within a regulated framework with increased transparency. New instruments for exchanges will be introduced in a gradual manner, as hitherto. Further areas for strengthening the functioning of OTC markets will include greater standardisation of OTC derivatives and suitably extending central clearing arrangements for such contracts where feasible.

However, there are a few open issues which need to be addressed:

- (i) **Contract standardisation:** standardisation is one of the prerequisites of moving contracts towards central clearing. There is merit in going by the argument put forth in a recent Financial Services Authority (FSA) paper that there are benefits from pursuing greater standardisation in itself, irrespective of whether these products are then cleared or traded on an exchange. Given the vanilla nature of products permitted in the Indian context, standardisation for existing products may not be difficult.
- (ii) **Bilateral collateralisation:** though bilateral collateralisation is considered an efficient, though sub-optimal, solution to central clearing, it involves significant trade-offs.
 - Move towards increased collateralisation could increase cost for hedging by the real sector and place huge premium on availability of good quality collateral. In case of client trades, it

may need to be recognised that a bank-client relationship is a much broader one and could include a credit relationship as well. Provision of a facility-wise collateralisation may work against the smaller clients which face difficulties in managing liquidity on a daily basis.

- Operationally, collateralisation is effective only if the exposure is calculated frequently and there is a mechanism to exchange collateral dynamically. Who would ensure this? It will invariably again be the bank's own model which will be used to arrive at both the exposures in favour or against the bank.
 - From a systemic perspective, there is also the issue of procyclicality that gets hardwired in the system through mark-to-market based collateralisation and this would be equally applicable in the central clearing model.
- (iii) **Push towards central clearing:** while CCP model is accepted as an ideal solution from a counterparty risk perspective, it is being increasingly recognised that a universal acceptance of CCP model would result in the concentration of risks at one point, which would potentially become the single point of failure for market stability. Certain issues become extremely critical in this regard:
- Clearability of contracts would be a key issue. The essence of a CCP arrangement is netting and margining, which are contingent on homogeneity of the underlying asset, availability of reliable prices and sound risk models to capture potential future exposures. The ability of models to capture tail risks is, however, put to question post crisis.
 - It would become imperative for the CCPs to be treated as 'too-big-to-fail' systemic entities and be brought under the oversight of the systemic regulator within a globally harmonised set of standards. In this regard one important and as yet unresolved question is whether CCPs should have access to central bank credit facilities and, if so, when. Given the incentives structures and the lack of competition in such market infrastructure entities, it may be worthwhile to consider CCPs as "public utility" and organise them as at-cost entities.

- (iv) **Higher capital requirements for non-cleared trades:** the Basel requirements already prescribe a capital charge for credit risk exposure of banks arising out of OTC derivative transactions. In as much as these exposures are reckoned on a gross basis, there is already a disincentive for bilaterally cleared OTC transactions as against centrally cleared transactions. To further address the systemic risks inherent in significant inter-bank OTC transactions, all such inter-bank exposures may be subject to a higher capital charge.
- (v) **Role for bespoke products:** this issue is more relevant for jurisdictions involving product regulation, as in India. The trade-off is between the requirements of the real sector and the risk assessment of the product. To give an example from our experience, certain zero-cost forex option/swap structures were permitted

in the past to enable better design of hedging solutions for clients. These cost reduction structures, introduced in 1996 inherently involved a trade-off between reduction in the cost of hedging and retention of part of the downside risk. The concerns relating to proper valuation, mis-selling of such products and other irregularities that emerged in the recent past forced a re-evaluation of the propriety of allowing such products in India.

However, interestingly, many corporates and industry associations represented that prohibiting cost reduction structures will seriously impede the dynamic forex risk management operations of corporates and their competitiveness in the global markets. It has been suggested that structures may be allowed with additional safeguards to address the leverage and mis-selling issues.

It would be interesting to see how the global debate in regard to the reform of the OTC derivative markets finally settles in various jurisdictions. In some senses, the approach seems an extension of the pre-crisis regulatory philosophy in these markets, with a non-obtrusive view of financial markets and financial products per se, while concentrating on stronger entity regulation and conduct of business aspect of the financial markets.

It would be important for the process to have any lasting impact that it is supplemented with a framework for regulating markets from a systemic risk perspective as well as ensuring sound prudential framework for regulation of all financial intermediaries engaged in derivatives, exchanges and CCPs. The reform of OTC derivatives cannot be disassociated from the larger perspective of the too-big-to-fail issue, at the heart of which is limiting the proprietary trading by banks.

For countries such as India, the collective experience of the developed markets at the epicentre of the crisis and their response in terms of changes to institutional and regulatory models is a great opportunity to tread a new path. Hopefully we will find effective ways to channelise the power of financial innovation in a more constructive manner.

ANNEX

Size of OTC derivative markets in India

The BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity in 2007 estimated that the percentage share of the rupee in total foreign exchange market turnover covering all currencies increased from 0.3 percent in 2004 to 0.7 percent in 2007. As per geographical distribution of foreign exchange market turnover, the share of India at USD 34 billion per day increased from 0.4 in 2004 to 0.9 percent in 2007.

The activity in the forex derivative markets can also be assessed from the positions outstanding in the books of the banking system. As of December 2009, total forex contracts outstanding in the banks' balance sheet amounted to INR 36,142 billion (USD 774.25 billion), of which over 86% were forwards and rest options (Table 1).

Table 1 Outstanding derivatives of banks: notional principal account

S.No	Item	March 2007		March 2008		March 2009		December 2009	
		INR billions	USD billions	INR billions	USD billions	INR billions	USD billions	INR billions	USD billions
1	Foreign exchange contracts	29,254	671.12	55,057	1,377.46	50,684	994.78	36,142	774.25
2	Forward forex contracts	24,653	565.57	47,360	1,184.89	44,669	876.72	31,190	668.17
3	Currency options purchased	4,601	105.55	7,697	192.57	6,015	118.06	4,952	106.08
4	Futures	2,290	52.53	2,743	68.63	3,511	68.91	3,447	73.84
5	Interest rate related contracts	41,958	962.56	85,430	2,137.35	44,803	879.35	46,434	994.73
6	<i>Of which:</i>								
	single currency interest rate swaps	41,597	954.28	85,159	2,130.57	44,377	870.99	46,073	987.00
7	Total -contracts/ derivatives	73,502	1,686.21	143,230	3,583.44	98,998	1,943.04	86,023	1,842.82

Source: RBI

With regards to interest rate derivatives, the inter-bank rupee swap market turnover, as reported on the CCIL platform, has witnessed a decline in terms of notional sum in 2009 over 2008 before some recovery in 2010, mostly on account of early termination of the contracts through multilateral netting (Table 2). The outstanding single currency interest rate swap contracts in banks' balance sheet, as on December 31, 2009, amounted to INR 46,073 billion (USD 987 billion) in notional principal while the amount of cross currency interest rate swaps was relatively at a lower level. The overnight index swaps (OIS) based on overnight MIBOR has been the most widely used OTC derivative for hedging interest rate risk. The market participation, however, remains much skewed with the foreign banks as the major player. The size of the Indian derivatives market is clearly evident from the above data, though by global standards it is still in its nascent stage.

Table 2 Outstanding volume in IRS for various benchmarks

	MIBOR ¹			MIFOR ²			INBMK ³		
	Notional sum		No. of trades	Notional sum		No. of trades	Notional sum		No. of trades
	INR billions	USD billions		INR billions	USD billions		INR billions	USD billions	
End-march 2008	36,556	838.63	61,665	6,116	140.31	16,528	137	3.14	368
End-march 2009	13,940	348.76	23,732	4,680	117.09	11,803	187	4.68	461
End-march 2010	17,488	343.24	29,853	3,269	64.16	8,201	204	4.00	450

¹ **MIBOR**: Mumbai Inter-bank Offered Rate: the benchmark rate published by NSE/FIMMDA based on polled rates from a panel of representative banks

² **MIFOR**: Mumbai Inter-bank Forward Offered Rate: implied forward rupee rate derived from USD LIBOR and the USD/INR forward premia

³ **INBMK**: Indian Benchmark Rate published by Reuters. This effectively presents a yield for government securities of a specific tenor.

OTC derivatives and central clearing: can all transactions be cleared?

JOHN HULL

*Maple Financial Professor of Derivatives and Risk Management
Joseph L. Rotman School of Management
University of Toronto*

The 2007-2009 financial crisis has led legislators on both sides of the Atlantic to propose laws that would require most “standardised” over-the-counter (OTC) derivatives to be cleared centrally. This paper examines these proposals. Although OTC derivatives did not cause the crisis, they do facilitate large speculative transactions and have the potential to create systemic risk. The main attraction of the central clearing proposals is that they will make positions in standardised derivatives more transparent. However, our experience from the 2007-2009 crisis suggests that large losses by financial institutions often arise from their positions in non-standard OTC derivatives. The paper argues that one way forward for regulators is to require all OTC derivatives (standard and non-standard) to be cleared centrally within three years. This would maximise the benefits of netting and reduce systemic risk while making it easier for regulators to carry out stress tests. The paper divides OTC derivatives into four categories and suggests how each category could be handled for clearing purposes.

When assessed in terms of its growth over the last 30 years, the OTC derivatives market has been very successful. The total principal underlying outstanding derivatives transactions in the OTC market is currently about ten times that for the exchange-traded market. Unlike the exchange-traded market, the OTC market is largely unregulated. This is likely to change soon. The huge derivatives losses experienced by financial institutions during the 2007-2009 financial crisis is leading governments on both sides of the Atlantic to propose legislation requiring that some OTC derivatives transactions move to central clearinghouses.

Once it has been negotiated between two parties, A and B, an OTC derivatives transaction can be cleared by being presented to a central clearing counterparty (CCP). Assuming the CCP accepts the transaction, it becomes the counterparty to both A and B. Each of A and B are able to net the transaction with other transactions they have entered into with other counterparties, providing those transactions are also being cleared through the CCP. The CCP takes on the credit risk of both A and B. It manages this risk by requiring an initial margin and calculating daily variation margins. It therefore operates in much the same way as a clearinghouse does for exchange-traded products such as futures.

It is anticipated that the legislation will, with some exceptions, require "standardised" derivatives to be cleared. There are a number of outstanding issues. Who will determine what is and is not a standardised transaction? (It could be either regulators or the CCPs themselves.) Will transactions involving industrial end-users be exempt from the CCP requirement? (The European Union appears to favor this.) Will foreign currency contracts be exempt? (At one stage, the US Congress favored this.) What assets will be acceptable to meet margin requirements? (Obviously cash will be acceptable for both the initial margin and variation margins. Marketable securities are usually acceptable in bilateral OTC collateralisation agreements, but, given the complexity of the multilateral transfers that have to be made each day, they might not be an acceptable form of variation margin to a CCP.)

Although the use of CCPs is not yet a legal requirement for any OTC derivatives, some credit

default swaps and interest rate swaps are currently being cleared through CCPs such as ICE Trust and LCH.Clearnet. Given the global nature of derivatives markets, it is obviously important that the laws enacted by different governments are similar. Once these laws are in place, the amount of business channeled through CCPs is likely to increase rapidly. Almost certainly, the Basel Committee will impose much higher capital requirements for transactions that are cleared bilaterally than for those cleared through CCPs. This will reduce any incentive derivatives dealers may have to make their contracts "slightly nonstandard" in order to avoid central clearing requirements.

Channeling OTC derivatives transactions through CCPs has two main objectives. The first is to reduce counterparty credit risk. A second is to increase transparency so that regulators are more easily able to quantify the positions being taken and carry out stress tests. This paper argues that it is important to ensure that all OTC derivatives are covered by the new rules. Credit derivatives were most prominent during the last crisis and have received most attention from regulators, but unless there is careful monitoring it is quite possible that in the future big destabilising positions will be taken in other derivatives, perhaps ones that have not yet even been invented. Acharya *et al* (2009) argue that central clearing should be used for actively traded OTC derivatives while others are monitored using a central registry. This paper argues that it is simpler, and also feasible, to require all derivatives to be cleared centrally and to do so in a way that makes it relatively easy for regulators to monitor exposures and carry out stress tests. The paper divides derivatives into four categories and discusses how each category can be handled.

1 | BACKGROUND

OTC derivatives markets were developed to allow end-users to manage their exposures more efficiently than is possible with exchange-traded markets. The advantage of the OTC market is that a transaction can be tailored to meet the precise needs of an end-user. For example, when a fund manager owns a portfolio of Japanese stocks, but thinks that US equities have better prospects over the next six months, a total return swap can be

a useful tool; when a company has exposures to five different exchange-rates, a basket option can be an attractive hedge.

The end-users of OTC derivatives have made it clear to legislators that they are happy with current arrangements. They do not want to be forced to post margin as this could lead to liquidity problems. Also, they do not want derivatives contracts to become standardised because this would make them less useful for hedging and might result in them not qualifying for hedge accounting. (In fact, it is unlikely that nonstandard derivatives will be banned. If they are not cleared, the regulatory capital requirements for nonstandard transactions will probably increase and as a result end-users might get slightly less attractive terms. But even this might not happen as the economic capital required for the transactions should not change.)

Of course not all OTC derivatives transactions can be classified as "socially useful". Some involve regulatory arbitrage (i.e., reducing the regulatory capital a bank has to keep without reducing its exposures); some are concerned with changing the tax or accounting treatment of an item; occasionally an OTC derivative is designed by a dealer to appear more attractive than it is to unwary end-users.¹

No doubt, regulators and politicians would love to keep the socially useful applications of OTC derivatives and outlaw the others. This is unlikely to be possible. In this section, we examine some of the objectives that might be achieved by regulating OTC derivatives.

1|1 OTC derivatives and the crisis

The first point to make is that OTC derivatives did not cause the 2007-2009 financial crisis (or previous financial crises). The causes of the crisis are complex and it would be a mistake to imagine that regulating OTC markets will somehow automatically prevent similar crises in the future. The crisis was caused by a mixture of macroeconomic events, government policies, the relaxation of lending standards by

financial institutions, and the failure of regulation.² If OTC derivatives markets did not exist, a severe world recession would still have occurred.

The crisis that unfolded was a result of low interest rates and a relaxation of lending standards by banks operating in the US residential mortgage market. The story is now familiar to most people. The relaxation of mortgage lending standards increased the demand for residential real estate, pushing up prices very fast during the 2000 to 2006 period. When some borrowers found that they could not service their loans there were foreclosures. This increased the supply of real estate and reversed the price increases. A positive feedback loop developed where price declines led to more foreclosures which in turn led to more price declines. OTC derivatives moved the default losses from one entity to another in the economy (sometimes in a fairly dramatic way), but they did not create the losses.

Why did US banks relax their lending standards? Some people have argued that this would not have happened without the development of an OTC market for securitising and resecuritising subprime mortgages. However, this is at most a small part of the story. Many of the tranches formed from subprime mortgages found their way back on to the books of banks. It seems unlikely that banks would knowingly make large numbers of bad loans, securitise them, and then buy the securitised products.³

1|2 OTC derivatives and systemic risk

Most large financial institutions have huge portfolios of derivatives and their counterparties in many of their OTC derivatives transactions are other large financial institutions. This is not because large financial institutions are using the markets for nothing more than betting with each other on the future direction of market variables. When a derivatives dealer enters into a transaction with an end-user it typically lays off its risk by entering into transactions with other dealers. This is what accounts for the vast majority of inter-dealer trades.

¹ Some people would include speculation in this list of non-socially-useful applications of OTC derivatives and some large synthetic transactions involving the subprime mortgage market have been widely criticised as having no redeeming qualities. However, speculators are an important source of liquidity in many derivatives markets.

² For example, Jagannathan et al (2009) argue that the fundamental cause of the crisis was a labor shock where large numbers of workers in developing countries found that they could compete with Western workers without relocating. Obstfeld and Rogoff (2009) similarly contend that increasing global trade imbalances were an important contributory factor.

³ The main motivation for banks to securitise mortgage assets and then buy the securitised products was a reduction in regulatory capital.

The OTC derivatives market is a potential source of systemic risk because a default by one large financial institution can lead to losses by other large financial institutions and defaults by these financial institutions. This in turn can lead to yet more losses by other financial institutions and a disaster for the financial system. Regulators are quite rightly concerned about this scenario. They have shown at the time of the Long Term Capital Markets failure in 1998 and at several times during the 2007-2009 crisis that they are prepared to take swift action to avoid any possibility of it happening.

Perhaps fortunately, we have never allowed a situation to develop where the extent of the systemic risk losses created by OTC derivatives can be observed and measured. It is reassuring that the financial system has survived defaults such as Drexel and Lehman without serious problems. It should be emphasised that financial institutions do not ignore systemic risk. They devote huge resources to managing counterparty risk, particularly that resulting from their derivatives transactions with other large financial institutions.⁴ Bilateral netting and collateralisation agreements, although not legal requirements, have become the norm for these transactions and have led to a huge reduction in systemic risk. Table 1 shows that netting reduced the aggregate derivatives exposures of dealers from USD 25.4 trillion to USD 3.7 trillion in June 2009. Much of the USD 3.7 trillion is collateralised, reducing counterparty risk much further.

One of the reasons CCPs are attractive to politicians and regulators is that they have the potential to increase the benefits of netting and collateralisation

Table 1
Dealer exposures before and after netting

Asset Class	Exposure (USD billions)
Foreign exchange	2,470
Interest rate	15,478
Equity-linked	879
Commodity	689
Credit default swaps	2,987
Unallocated	2,868
Total	25,372
Total after netting	3,744

Source: BIS, June 2009.

⁴ See for example Gregory (2010) and Hull (2010).

⁵ There are exceptions. Some of the large losses that have been reported (or example, Allied Irish Bank's loss in 2002) were caused by traders finding ways of hiding the exposures created by standard OTC transactions. But in general exposures created by standard OTC derivatives are well understood and therefore less likely to be tolerated.

with the result that counterparty risk is reduced still further and there is less chance of systemic risk leading to a failure of the financial system. As will be discussed later, they also have the potential to make OTC derivatives more transparent and easier to regulate.

1|3 OTC derivatives and speculation

OTC derivatives make it easier for financial institutions to take huge risks. Many financial institutions such as Bear Stearns, Merrill Lynch, Citigroup, and AIG Financial Products appear to have succumbed to the temptation of doing this in the first decade of the 21st century. The AIG situation was particularly extreme. The company sold credit default swap (CDS) protection against losses on the securitised products created from subprime mortgages. When the company was downgraded below AA, it was required to post a huge amount of collateral with its counterparties and was unable to do so. The US government provided an USD 85 billion injection of funds to avoid a default.

Would the type of central-clearing legislation currently being proposed have prevented the AIG fiasco? The answer is that it probably would not have done so. The legislation requires standardised CDS transactions to be cleared. It is likely that in, say, 2006 the list of standardised derivatives for which clearing is required would have included single-name CDSs that provide protection against defaults by corporate or sovereign entities. It would also have included transactions that provide protection against losses on standardised portfolios such as iTraxx Europe and CDX NA IG. However, the AIG transactions were nonstandard. They related to losses on tranches created from particular mortgage portfolios (and from tranches created from those tranches). It is unlikely that the type of legislation now being proposed, if enacted five years ago, would have covered them.

Casual empiricism suggests that when large speculative positions are taken by financial institutions, they are usually in non-standard OTC derivatives.⁵ Regulators should therefore give more

attention to these instruments. Later this paper argues that using CCPs for all OTC derivatives is not an unreasonable goal. But, at minimum the new regulatory regime for OTC derivatives should require non-standard OTC derivatives between systemically important financial institutions to be subject to two-way collateralisation agreements with no threshold.⁶ Downgrade triggers such as those that were used by AIG's counterparties should not be permitted as they tend to exacerbate systemic risk.

An important point here is that, all too often, the collateralisation of non-standard OTC derivatives is hampered by arguments over their market value. When A demands that collateral be posted by B because the net value of outstanding transactions between them has moved in A's favor, B may dispute the valuation and it may take some time to resolve the issue. If bilateral agreements do remain a feature of the OTC derivatives market, a compulsory feature of such agreements (at least when a systemically important financial institution is on one side) should be that for each transaction either a) a third party is designated to calculate the daily market value or b) the procedure for calculating the daily market value is specified in the credit support annex.

1|4 OTC derivatives and transparency

One advantage often cited for CCPs is that they will bring extra transparency to the OTC market. There are two aspects to transparency. One is concerned with knowing the market prices of instruments traded in the OTC market; the other is concerned with knowing the positions taken by the financial institutions trading in the market.

The term "dark markets" has been used to describe OTC markets. This is perhaps a little extreme. It is notable that market participants such as dealers, fund managers and corporate treasurers do not seem to be the ones complaining about price transparency. On-line services such as Bloomberg and Reuters disseminate dealer prices to the market. It is true that the quote given by a dealer for a plain vanilla OTC derivative may depend to a small extent on the size of the trade, the dealer's inventory, the extent

to which the dealer is capital constrained, the credit quality of the counterparty, and other transactions that are outstanding with the counterparty. This is hardly surprising. It should not be taken as evidence that dealers are purposely concealing key information from their clients. Highly structured transactions such as synthetic CDOs may see a bigger price variation from one dealer to another, but this is also as one would expect and not something that regulators should be concerned about.

Knowing the transactions undertaken by financial institutions is important to regulators so that they are aware of large speculative positions and can monitor systemic risk.⁷ The challenge is to arrange for positions to be reported and aggregated so that the results are useful to regulators. CCPs have a role to play here as we discuss later. It is clearly important for regulators to determine the daily changes in the values of non-standard transactions as well as standardised transaction because, as already pointed out, when large speculative positions are taken, they tend to be in non-standard transactions.

2| THE ADVANTAGES OF CENTRAL CLEARING

Duffie and Zhu (2009) make the important point that central clearing does not necessarily improve netting efficiency. The efficiency of central clearing depends on the number of CCPs and the proportion of all OTC derivatives that are cleared. Central clearing always improves netting efficiency when a single CCP is used for all OTC derivatives. If the current legislation leads to, say, 60% of all OTC trades being cleared through 10 different CCPs it is not necessarily the case that the USD 3,744 billion figure in Table 1 will be improved upon. Indeed it might get worse.

A simple example will show why this is. We suppose that there are three derivatives dealers (A, B, and C) and two categories of products, only one of which is cleared. (The cleared product category could be all standardised OTC derivatives and the non-cleared category all non-standard OTC derivatives.)

⁶ This means that each party has to post with the other collateral equal to the greater of the net value of outstanding transactions to the other party and zero.

⁷ It is not so clear that others need this information. If it is considered to be in the public interest to give the information to non-regulators, the information should be non-current at the time it is made available. Divulging the current positions of a financial institution to competitors would not be a sensible move. If potential counterparties know the hedging trades the financial institution needs to do, the financial institution is less likely to get competitive quotes.

The mark-to-market value of the dealers' positions is indicated by the arrows in the left part of Figure 1, which assumes that all transactions are cleared bilaterally. For example, dealer A's transactions with dealer B are worth -100 to dealer A in the non-cleared product type and +50 to dealer A in the cleared product type. With bilateral clearing the net exposures of A, B, and C are 0, 100, and 20, respectively. The right part of Figure 1 shows how this situation changes when a CCP is used for the cleared category. The net exposures of A, B, and C, including exposures to the CCP, are now much higher at 120, 120, and 90, respectively. Even when exposures to the CCP are not included, the average of the three exposures is 75% higher than without the CCP.

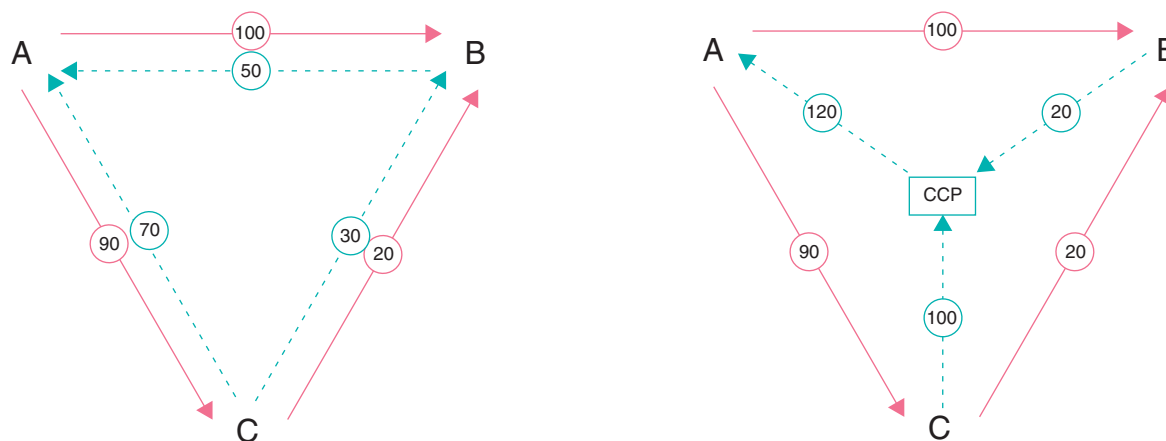
Extrapolating from this example, netting efficiency increases as the percentage of OTC trades that are cleared increases. With multiple CCPs, the netting efficiency may decline. However, there is likely to be some consolidation of CCPs over time. Also, netting agreements between CCPs should develop.

For example, if a dealer receives 15 from one CCP in a day and must pay 25 to another CCP, there could be an agreement whereby the dealer has to pay 10 to the second CCP. The remaining 15 would be automatically transferred from the first CCP.⁸

Netting efficiency is not the only reason (perhaps not even the main reason) for central clearing. Central clearing will lead to an increase in transparency because the positions of different dealers can be more readily ascertained. It will lead to more collateral (margin) being posted so that, when a dealer defaults, losses are likely to be less. Furthermore losses will be distributed throughout the clearinghouse members. In the case of bilateral clearing, there is a chance that large losses have to be absorbed by a small number of counterparties.

Another important potential advantage of CCPs is that they may reduce the chance that unsubstantiated rumors lead to the downfall of a dealer. When a dealer is thought to be experiencing difficulties, other dealers may stop posting collateral or refuse to

Figure 1



Example of a situation where a CCP increases exposures after netting. The exposures represented by the dotted line are cleared. Those represented by the solid line are not. The exposures after bilateral netting are compared with the exposures when the CCP is used.

Dealer	Exposure after bilateral netting
A	0
B	100
C	20
Average	40

Dealer	Exposure after netting included CCP	Exposure after netting excluded CCP
A	120	0
B	120	120
C	90	90
Average	110	70

8 Given that the assets used to satisfy CCP variation margin requirements are likely to be either cash or highly liquid assets, this form of rehypothecation is likely to cause far less problems than rehypothecation in bilateral collateralisation agreements.

trade with it or enter into trades that are designed to reduce their exposure to the dealer. This may cause cash flow problems for the dealer and hasten its demise. Arguably, this is less likely to happen when trades are done through CCPs because a CCP should ignore rumours in calculating and implementing variation margins.

Of course, there is a risk that a CCP will fail. Traditionally, clearinghouses for exchange-traded derivatives have been well run and there have been few problems. (Basel II assigns a risk weight of zero for trades with a clearinghouse.) The consequences of a failure by a CCP that is used for OTC trades could be even more disastrous than the failure of a large dealer. However, a CCP is nothing like as complex as a large bank. It should be regulated as utility and not allowed to trade on its own account.

3 | HOW MUCH CAN BE CLEARED?

There are many reasons for wanting to clear centrally as big a proportion of all OTC derivatives trades as possible. This maximises the netting benefits of central clearing and minimises counterparty risk. It also gives regulators a better handle on the risks being taken by dealers.

The key requirement for clearing a transaction centrally is that it be possible to value the transaction daily for the purposes of calculating daily variation margins. We have already mentioned that it is important to require the parties to any non-cleared transaction between systemically important counterparties to enter into collateralisation agreements for those transactions. They should also agree on a method by which the values of the transactions are calculated for the purposes of the collateralisation agreements. Otherwise the collateralisation agreements are liable to be ineffective because of disputes about who owes whom what. It is a short step from this to argue that the valuation methodology should be made available to a CCP so that the transaction can be cleared centrally. Furthermore, if the valuation methodology can be passed to a CCP, it can be made available to regulators for stress testing and other analyses they might wish to carry out.

In considering how easy it is to clear OTC derivatives transactions, it is useful to divide products into four categories:

1. Plain vanilla derivatives with standard maturity dates;
2. Plain vanilla derivatives with non-standard maturities dates;
3. Non-standard derivatives for which there are well established pricing models;
4. Highly structured deals.

Derivatives in the first category are the ones that CCPs are likely to be most comfortable with and the ones that have the potential to be traded on exchanges. Often the current value of transactions in the first category can be observed directly in the market. If this is not the case, it is convenient that interest rates, credit spreads, and similar market variables are required only for standard maturities. (Often the standard maturities are international monetary market dates.)

For derivatives in the second category, standard procedures are used by the market to interpolate variables such as interest rates, credit spreads, forward prices of assets, and volatilities so that the observable values of these variables can be used to calculate required values. For example, the credit spread for a certain maturity can be estimated from the observed credit spreads for neighboring maturities; the volatility used to price an option that has a certain strike price and time to maturity can be estimated from the observable volatilities of options with neighboring strike prices and times to maturity.

The distinguishing characteristic of derivatives in the first two categories is that they are priced with reference to the market prices of other derivatives of the same type. CDSs are priced with reference to other CDSs; options on an exchange rate are priced with reference to other options on that exchange rate. The procedure where one derivative is priced using other derivatives that trade as reference points is known as "calibration." Derivatives in the first two categories are therefore calibrated to derivatives of the same type for the purposes of pricing.

Derivatives in the third category are different from those in the first two categories in that they are not traded actively enough for them to be calibrated to derivatives of the same type for the purposes of pricing. There are a wide range of derivatives in the third category such as Asian options, barrier options, compound options, basket options, accrual swaps, and so on. Typically they have to be calibrated to other simpler derivatives, and sometimes empirical data has to be used. For example, the price of an Asian option is usually based on the prices of plain vanilla options on the same asset; the price of a basket option is usually based on the prices of plain vanilla options on the assets comprising the basket and correlations between the assets' prices estimated from empirical data; the price of an accrual swap is based on the prices of plain vanilla interest rate swaps and interest rate caps; and so on.

It is probably unreasonable to expect a CCP to develop the technology to price all OTC derivatives in the third category. However, a reasonable requirement is that market participants provide the CCP with valuation software when the OTC derivative is traded. This valuation software would conform to input-output requirements specified by the CCP. Typically, what will be provided will be a core valuation routine that depends on a set of inputs (interest rates, exchange rates, forward prices of assets, volatilities, etc). CCPs will be able to use the routines they develop for derivatives in the second category to carry out interpolations necessary to provide the inputs. Models for valuing the derivatives in the third category are in the public domain, but some dealers are likely to have their own proprietary models in some cases. They should not be under an obligation to provide those models to the CCP. They should be allowed to supply the standard model that is in the public domain providing the model captures the key properties of the transaction.

Derivatives in the fourth category are more problematic because they are usually quite complex and models for valuing them are less readily available. But it is important to find a way of handling them. As mentioned earlier it is often these types of derivatives that lead to huge speculative

positions and have the potential to increase systemic risk. Market participants should be given a choice. They can either provide software (agreed to by both parties) to the CCP or they can appoint a third party who will provide daily valuations to the CCP.

The software at CCPs would be made available to regulators for the purposes of stress testing and other analyses. In the case of situations where valuations for transactions are provided by a third party, the third party should be obligated to carry out analyses for regulators on the transactions when directed. These proposals are designed to ensure that all OTC derivatives are cleared and to make it easier for regulators to understand and analyse what is going in the OTC market. A reasonable time line might involve implementing the proposal for all derivatives in the first two categories within one year and implementing the proposals for all derivatives in the third and fourth categories within three years. Whether it is feasible to apply the proposals to outstanding derivatives transactions as well as to new transactions needs to be given careful consideration.

One issue is that, when a dealer trades with an end-user, the dealer's inception profit is liable to lead to a requirement for the end-user to post an immediate variation margin. For highly structured products the inception profit is often quite high, but is justifiable because of the difficulties in hedging the product and other uncertainties that the dealer faces. It should be permissible for the models communicated to CCPs (or used by third parties) to amortise the inception profit over the life of the transaction. This corresponds to the practice of many financial institutions.

Inevitably there will be some exemptions from central clearing. Industrial end-users for example are claiming their right to an exemption because their dealer-counterparties often do not currently require them to post collateral.⁹ Exemptions can be classified as "zero-margin trades." They would still have to be registered with a CCP and daily valuations for them would be required, as for trades that are cleared. However, no initial margin or variation margin would be required from either

⁹ Whether this exemption is necessary is debatable. The reality is that a dealer who does not require collateral is implicitly providing the end-user with a flexible line of credit that covers possible future values of the transaction to the dealer. Given that the dealer is prepared to do this, it should also be prepared to enter into an agreement where it lends the end-user funds sufficient to meet the margin amounts required by the CCP.

side and the CCP would not be a counterparty to either side. The advantage of this is that they could be easily included in analyses conducted by regulators.

There are a number of details to be worked out. One issue is how the initial margin requirement on a diverse portfolio of OTC derivatives should be set. This involves a statistical analysis on how large the movements in the value of the portfolio could be over a period of one or two days. Clearinghouses have accumulated considerable expertise in this area. But the way in which transactions such as single name CDSs or barrier options, whose values can show big jumps in a day, contribute to initial margin requirements may have to be thought through carefully.

The main benefits of the proposals that have been outlined are a reduction of counterparty credit risk and more transparency for regulators. However, politicians and regulators may also like the proposals for other reasons. The existence of a valuation model might lead less sophisticated counterparties to better understand the risks they are taking. It might also lead to highly complex transactions becoming less common.

There will of course be resistance to the proposal from some dealers, particularly if they feel that it will make it more difficult for them to negotiate complex deals with high inception profits. However, the proposal is better than the alternative where the ability of financial institutions to innovate and trade in the OTC derivatives is eroded by regulation over time.

There are many advantages to using CCPs for over-the-counter derivatives. As the percentage of OTC derivatives that are cleared increases, these advantages increase. This paper has argued that monitoring a financial institution's exposures to non-standard derivatives is as important, if not more important, than monitoring its exposure to standardised derivatives. It is tempting to focus attention on credit derivatives because these were of most concern during the 2007-2009 crisis. But the next big rise in systematic risk in the market may be a result of dealers taking large positions in quite different OTC derivatives from these, possibly ones that have yet to be invented. The regulation of OTC derivatives should allow the monitoring of the market to be as comprehensive as possible. This paper has proposed one of the directions we can go in.

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21st century finance cannot do without a sound regulation of the OTC derivatives markets

JEAN-PIERRE JOUYET

Chairman

Autorité des marchés financiers

OTC derivatives were quite rightly signaled out for their role in triggering and propagating the financial crisis. Admittedly, they can give rise to risk, regulatory arbitrage, complexity, and even financial system instability. However, they also contribute to the financing of the economy and to the smooth functioning of markets. Therefore, in order to retain the benefits and mitigate the risks, these products must be regulated appropriately. This regulation must not focus solely on prudential issues. The market regulator must play a role in establishing a renewed regulatory framework for these markets. The latter must be more transparent and their very organisation must evolve. The Committee of European Securities Regulators (CESR) has proposed a roadmap based on the three-fold approach of standardisation, clearing, and creation and registration of the corresponding market infrastructures. In addition, an even more ambitious overhaul should be considered of the national and European regulatory frameworks whose contours were designed before the explosion in derivatives trading volumes took place. They must now incorporate this new dimension of modern markets.

The Bank for International Settlements (BIS) calculates that notional amounts outstanding of derivatives contracts increased more than sevenfold in the decade between 1999 and 2009 and now exceed USD 600 trillion. A niche market ten years ago, credit default swaps (CDSs) are now worth a notional USD 40 trillion, down from a pre-crisis peak of USD 60 trillion.¹ By comparison, the International Monetary Fund (IMF) estimated global GDP at approximately USD 60 trillion in 2008, while the World Federation of Exchanges put the global capitalisation of listed companies at around USD 50 trillion in 2009. Given how derivatives markets have expanded, coupled with the resulting risk that they could destabilise the financial system, it is vital to regulate these markets appropriately.

II THE ROLE OF DERIVATIVES CONTRACTS AND MARKETS

THESE ARE USEFUL MARKETS...

There is no question about the usefulness of derivatives contracts, which proved their worth long before the 21st century. Forward contracts, in which a seller and a buyer agree on the future price to be paid to exchange an asset, have existed for many years. Industrial firms have long used this type of products to manage currency risk as well as the risk of price fluctuations for the raw materials they consume. By cushioning the risk of price swings, derivatives play a vital role in enabling these companies to plan their investments. This is the primary and most common role played by derivative instruments, that is to say a tool for transferring and managing risk. Today's sophisticated derivatives markets and products can be used to carefully manage a wide array of exposures, from currency, interest rate, credit and commodity risk, to equity market exposure and even the risk of volatility or correlation. The variety on offer gives companies access to a wide spectrum of products, which have become vital components of their financial risk management processes. Financial institutions are naturally the heaviest users of derivatives contracts.

Considerations such as leverage and the size of their balance sheets mean that managing financial risk is an especially complex process for them, and derivative instruments are an extremely useful part of their toolbox.

But from simple devices for transferring risk, derivatives quickly evolved to take on more complex and innovative risk profiles. The first option derivatives revolutionised the way that financial markets and companies work by making it possible not merely to agree on the future traded price of an asset, but also to take out protection, in return for a premium, against a decline (increase) in the price of that asset below (above) a given level. This insurance mechanism paved the way for new kinds of asymmetric risk profiles. Such instruments form the foundation, for example, of convertible bonds, which are corporate finance instruments with a hybrid risk/return configuration that lie half-way between more conventional instruments such as equities and bonds. Similarly, without these types of instruments, it would not have been possible to offer capped variable rate mortgages, which allow borrowers to profit partially from a decline in money market rates, while limiting risk in the event that the same rates go up.

Derivatives also contribute to financial market liquidity. CDSs, which received heavy criticism amid the financial crisis, provide liquidity to credit markets. Sometimes, they are more liquid than the same issuer's bonds. While each bond issue is unique, the CDSs exposed to the issuer's credit risk may be standardised and fungible, and hence more liquid than individual bonds.

Finally, derivatives play a part in price formation by sending price signals to the market. This occurs, for example, when price formation mechanisms on cash markets do not provide adequate transparency on transaction prices. On some commodity markets, the main objective price benchmarks are derivatives prices, which some professionals even use to index the prices set in commercial contracts. On other markets, the price information provided by derivatives markets is used alongside information on cash transaction prices disseminated by specialised companies, such as Platts and Argus on oil markets.

¹ The crisis forced the financial industry to begin scaling back the volume of outstanding contracts.

...IF PROPERLY REGULATED

These examples are a non-exhaustive list of the ways in which derivatives markets play a useful role in delivering financing and ensuring an orderly economy. But these markets must be correctly regulated. Because financial market regulation has traditionally concentrated on conventional capital markets, i.e. equity markets, it has been slow to reflect the effects of the explosion in outstanding derivatives.² Without appropriate regulation, the use of derivatives could at best generate inefficiencies, additional costs or arbitrage opportunities for market participants. At worst, they could be a source of systemic risk, which is what prompted Warren Buffett to dub them "financial weapons of mass destruction" in 2002. What are the main potential risks that these products pose and that explain the determination to regulate them?

First, there are the risks of regulatory arbitrage. Derivatives can be used to transfer financial value between two participants by disconnecting that value from the origin of the profit or from the legal category of the corresponding physical transaction. They can even be embedded in other financial products, such as investment funds or bonds, which are then called "structured," and which assume a completely different risk/reward profile by incorporating the derivative component. For example, derivatives can be used to create a structured bond whose risk profile replicates that of an investor on an equity market index. The legal nature of the security (bond) no longer bears any relation to its risk profile or the associated income streams. Alternatively, they can enable equity investment funds to offer a money market return. There is thus a high risk that these sorts of products could be used for regulatory arbitrage.

That arbitrage may have a tax focus. Contracts for difference³ did well in the United Kingdom in part because they enable investors to avoid stamp duty. Getting around marketing rules may be another objective. The restrictions on marketing a structured bond may differ from those that apply to an embedded derivative product. These products may also be used for accounting or prudential arbitrage: if a derivative exchanged between a bank

and an insurance company is subject to different accounting or prudential rules, it could increase the earnings or reduce the capital requirements of each of the contracting parties. Meanwhile, the currency swap between Goldman Sachs and the Greek Treasury, which was recently reported in the media, illustrates how derivatives can be used to window-dress sovereign debt: the exchange rate used for the swap resulted in a large up-front payment from the bank to the Treasury, which apparently – the operative word – modified Greece's debt. Of course, the scope for arbitrage options is increased in an international setting by the countless differences, tiny or otherwise, between domestic regulatory regimes.

Another example of risks arising from the growing use of derivatives concerns the deep interconnections that these products have created between financial institutions. Whereas a trade on equity markets can be settled in three days, a derivatives contract might tie the parties for several years. The flip-side of the explosion in the outstanding amount of derivatives is that financial institutions are increasingly interlinked; moreover, these linkages are based on contracts whose clauses or governing law may vary significantly, making it extremely tricky to settle contracts when a large financial institution⁴ fails. Among other things, central banks were created to ensure that the interconnections between financial institutions resulting from interbank loans would not trigger a domino effect destroying entire swathes of the banking system following a failure by a major counterparty. With the rise of derivatives markets, these interconnections have been reestablished through a dense and complex network of derivatives transactions that have made the financial system less resilient.

There is also the risk that there may be a poor assessment of the risk, profile and value of derivatives. Derivative financial products may be highly complex and awkward to price. Some expose the holder to extreme risks that are undetectable to conventional measurement tools. Consider for example that while some structured products may have had a AAA rating, which gave information about the probability of default according to a standard risk gauge, at the same time these products were

² For example, the UCITS Directive did not adjust the regulatory framework for European investment funds to accommodate derivatives until 2001.

³ A derivative instrument that exposes the buyer to the price difference of an equity between the time when the derivative is arranged and when it is settled.

⁴ Such as Lehman Brothers.

exposed to atypical risks. Whatever other criticisms may have been made concerning the rating of structured products, it is very worrying that ratings masked the risk of extreme losses linked to the high sensitivity of products to the default rate on their constituent loans.

One final example of the potential impact of derivatives concerns the fact that derivative products can also lead to anomalous outcomes in corporate finance transactions or corporate governance. Shareholders who hedge their exposure on derivatives markets no longer care about the company's performance, despite their duty to vote at general shareholder meetings, and creditors may not be interested in debt restructuring terms if they have hedged their risk with CDSs. The situation may be exacerbated if they have overhedged their exposure.

The use of derivatives is not the only source of tax and regulatory arbitrage or of systemic risk. But the complexity of these products explains partly why their impact is misunderstood by professionals and poorly (or belatedly) addressed by regulation. At the same time, their rapid growth has increased their potentially harmful effects. For example, although the Markets in Financial Instruments Directive (MiFID) covers derivative products, a number of its provisions draw on equity market concepts, such as "orders", that do not translate easily to derivatives markets, which have a fundamentally different structure. The same is true of the Market Abuse Directive (MAD). In France, derivatives were only recently incorporated into the major holding notification framework through amendments to the general regulations of the securities regulator, the *Autorité des marchés financiers* (AMF). In other words, rule-making is lagging market fundamentals. That gap must be closed, primarily by tackling OTC derivatives markets, which are the most opaque. The first step is to prepare regulations that are tailored to OTC derivatives markets and to assign sufficient resources to supervising these markets. Then, we need to conduct a comprehensive review of all existing rules and regulations with a view to integrating the potential impacts of derivative products.

2 | THE ROLE OF MARKET REGULATORS

Current regulations and the resources deployed by regulators to supervise OTC derivatives markets have been shown to be inadequate. Working on the misconception that markets could organise themselves best without regulatory involvement and that the participation of professionals guaranteed the system's security and efficiency, regulators held back from markets that were nevertheless growing swiftly, leading in some cases to operational problems, misreading of risks by participants and areas of opacity.

The crisis exposed the limitations of this approach and forced prudential and market regulators alike to introduce appropriate instruments to regulate and supervise these markets.

BECAUSE OTC DERIVATIVES MARKETS ARE SYSTEMICALLY IMPORTANT ...

While the "too-big-to-fail" debate has been going on for a long time – and has returned to the foreground since the Lehman Brothers bankruptcy – the question of "systemically important markets" has emerged since the crisis. The risk of a failure by a financial institution has now been joined by the risk of a major market malfunction or stoppage. This issue is made more pressing because in a mark-to-market environment, the entire economic sphere relies on the prices supplied by markets.

How should systemically important markets be defined and identified? Following a request by the G20, the IMF, the Financial Stability Board (FSB) and the BIS proposed using the following criteria to determine the systemic importance of a financial institution or market:⁵ size (the volume of financial services supplied), substitutability (the extent to which other components of the financial system can provide the same services in the event of a failure) and interconnectedness (linkages with

5 IMF, FSB, BIS, *Report to G20 Finance Ministers and Governors: "Guidance to assess the systemic importance of financial institutions, markets and instruments: initial considerations"*, October 2009. See also the report on systemic risk submitted by Jean-François Lepetit to the Minister for the Economy, Industry and Employment, April 2010.

other components of the financial system). These three main criteria should be complemented with other contributing factors, such as complexity, leverage and liquidity risks, as well as, in the case of markets, the size and number of participants and the level of concentration. Conversely, the institutional framework may help to reduce these vulnerabilities, for example via clearing and settlement systems and the arrangements for handling crises and defaults.

Over-the-counter (OTC) derivatives markets obviously meet many of these criteria, naturally because of their size and the interconnections that they create between participants, but also because the crisis exposed the interdependencies between these markets and other components of the financial system. There are interdependencies between OTC derivatives markets and more liquid regulated markets (equity markets in practice), which were impacted during the crisis by problems on OTC markets;⁶ between derivatives markets and underlying markets, particularly as regards the provision of pricing information; between different segments of derivatives markets, in particular because the same participants are present on all of them; and between markets and financial institutions themselves, firstly as regards financing, managing and pricing risks and valuing assets, and secondly as regards the provision of liquidity by market makers.

...THEY NEED TO BE REGULATED AND SUPERVISED BY MARKET REGULATORS ALONGSIDE PRUDENTIAL REGULATORS

Whereas central banks and prudential authorities have traditionally paid attention to financial stability, the same is not true for market authorities, for whom this is a new concern. However, recognising that some markets may be systemically important means that market regulators must fully appropriate the objective of financial stability alongside prudential regulators. Following recommendations issued by the G20, the International Organization of Securities

Commissions (IOSCO) set out to strengthen its regulatory principles as regards the prevention of systemic risk. In its New Strategy Proposals published in 2009,⁷ the AMF once again named risk prevention and market supervision among its priorities. To meet these objectives, the AMF has to extend its scope of supervision to OTC markets (derivatives but also others, such as bonds) and step up monitoring of financial innovation. In the early part of the year, the AMF created an in-house risk committee, which it will use to provide input for domestic, European and international work on monitoring macroeconomic risk and financial stability, within the new Financial Regulation and Systemic Risk Board in France (established by the Banking and Financial Regulation Bill), the European Systemic Risk Board (ESRB) proposed by the European Union and the FSB at international level. Market regulators need to be suitably represented in these different forums given their growing involvement in the regulation of systemic risk.

As well as contributing to the objective of financial stability, derivatives market regulation must not neglect its more traditional goals in the area of microeconomic regulation, such as ensuring orderly markets and improving market transparency. This twofold mission explains why the objectives (compliance with rules of conduct, prevention of market abuse, supervision of market practices) and the supervisory resources (transaction reporting system, market surveillance tools) used by the market regulator are both different from and complementary to those of prudential regulators. To properly discharge its twofold assignment, the market regulator must supervise all market components, including participants (intermediaries, managers, rating agencies, etc.) and their practices, e.g. short-selling, as well as products, trading and post-trade systems (including the trade repositories that are to be introduced shortly).

These issues are currently under debate in a variety of forums. For European market regulators, the main work programme on OTC derivatives market regulation is undoubtedly that being taken forward

⁶ Participants used the liquidity offered by regulated markets (the biggest ones being equity markets of course) to sell instruments, cover losses and meet margin calls on OTC markets.

⁷ AMF's New Strategy Proposals, 29 June 2009. The operational measures derived from the plan were published in December 2009.

by the Committee of European Securities Regulators (CESR) in partnership with the European Commission to enhance the security and transparency of OTC derivatives markets. However, the reforms proposed within this framework will not be enough to complete the regulatory arrangements for these markets. The entire European legal framework will have to be overhauled.

3| CESR'S ROADMAP

After publishing its communication on policy actions to ensure efficient, safe and sound derivatives markets, the European Commission assembled a working group in January 2010 comprising representatives from Member States, CESR and the European Central Bank. The group was tasked with considering legislative policy guidelines for 2010 regarding OTC derivatives markets. It has concentrated on two main areas: reducing counterparty risk through centralised clearing of standardised contracts; and improving the transparency of OTC derivatives markets by gathering data in central data repositories.

To provide input to the Commission's work, CESR initiated discussions through its Post-Trade Standing Committee, which the AMF chairs. Dedicated task forces were created to make concrete proposals in three priority areas: a core set of requirements for clearing houses, trade repositories, and the conditions for implementing mandatory clearing of standardised derivatives contracts.

Meanwhile, CESR's standing committee on secondary markets has also put forward proposals on the transparency and execution of transactions in financial instruments other than equities.

It seems important at this point to explain where the AMF stands on the main options being studied by the different task forces and on the changes needed to reform the functioning of OTC derivatives markets.

PROMOTE WIDER USE OF CENTRAL CLEARING COUNTERPARTIES

Following the declarations made by the G20, various countries have launched legislative initiatives on the mandatory use of central counterparties for standardised OTC derivatives contracts. In addition to helping to reduce the net exposure of the overall financial system, wider use of centralised clearing would modify the way in which risk is disseminated in the market. There are those who stress that bilateral management of counterparty risk – the model currently used on OTC derivatives markets – gives market participants valuable flexibility in terms of managing risk. But within this framework, the level and quality of collateral are determined by counterparties using criteria that may vary from one institution to another. This creates the danger that the risks generated by the transactions may not be perfectly covered. The OTC derivatives market is particularly opaque, leaving it more exposed to less stringent risk management standards than the regulator-vetted standards applied by a central clearing counterparty. Bilateral management of counterparty risk also contributes to a misreading of aggregate risk and the distribution of risk between counterparties.

In addition, in the bilateral risk management model, a market participant's default may be problematic. Every participant has to work directly with the administrator of the failed company to deal with dishonoured contracts, which increases uncertainty over the settlement terms for each counterparty of the failed participant. The market as a whole may refuse or be reluctant to sign new contracts with participants that have potential exposure to the failed party; in extreme market conditions, such reluctance to trade may spread to the wider market, which then becomes illiquid.

By contrast, the centralised clearing model makes it possible to establish harmonised basic requirements for managing risk and calculating margins. All clearing house members thus benefit from rigorous risk management practices, as well as reduced

overall exposure to the central clearer. In the event of a default by a clearing member, the central counterparty continues to honour the contracts that it has cleared vis-à-vis other members by drawing on the financial resources at its disposal, starting with the margin provided by the failed member, followed if need be by the member's payments into the clearing fund, followed by other clearing members' contributions to the fund, followed lastly by the capital of the clearing house itself. The central counterparty will manage the dishonoured commitments of the defaulting member directly with the bankruptcy administrator, in a centralised manner. Each of these layers of protection is an opportunity to limit the risk that a failure by a financial institution could contaminate the rest of the market or financial system. This makes the case for a broad extension of the scope of clearing to include OTC-traded derivative instruments.

However, the central counterparty then by definition becomes the counterparty of each market participant. It concentrates risks, which may be viewed as a risk factor in and of itself. Each participant has greater exposure to the clearing house alone than it would have otherwise had to individual bilateral counterparties. But this argument can be tempered by the quality of risk management arrangements established by the central counterparty and required by the regulations. For this reason, it is vital to have strict standards to ensure the resilience of central counterparties, but also to limit the opportunities for regulatory arbitrage created by the regulations of these institutions, which will lie at the heart of the framework for supervising systemic risk. For this, three things are needed.

First, the regulation of central counterparties needs to be based on standards that guarantee the soundness of these entities by giving them credit-institution status. European legislative provisions should set requirements for operational resilience, covering areas such as adequate technical and human resources, supervision of outsourced functions, and continuity and recovery plans.

To ensure financial and/or legal resilience, provision must be made to guarantee adequate financial resources to cover the risks to which central counterparties are exposed. Risk management provisions must include measures to ensure prudent management of the collateral posted by members and ensure the existence of robust procedures to manage a member default.

Second, the future European supervisory authorities must be assigned broad powers to regulate clearing houses, to avoid any risk of regulatory arbitrage. While national regulators should be responsible for day-to-day supervision (because they have a local presence and are thus more responsive), the European Securities and Markets Authority (ESMA), the European Banking Authority (EBA), and the European System of Central Banks (ESCB) should manage the authorisation process and have the right to ask to review the situation of central counterparties and the way they are operated and supervised. These authorities should also be at the core of any future process for recognising clearing houses outside Europe.

Third, locating central counterparties in the monetary area of the currency of the contracts that they clear will help to promote sound clearing houses by providing access to central bank refinancing facilities (intraday and overnight liquidity).

It will of course be necessary to determine the scope of the requirement to clear in terms of products and participants because this will determine the impact of the principle of centralised clearing on reducing counterparty risk. ESMA should play a key role in authorising products to be cleared and in monitoring the thresholds for contracts cleared. In this context, the AMF is participating actively in CESR's work on formulating a process for determining the requirement to clear. The European Commission wanted to leave central counterparties to decide which contracts should be subject to mandatory clearing; they would then apply to the national authorities to authorise

clearing for the contracts in question and send that information to ESMA. The AMF, like the other French financial regulators, would prefer ESMA, in partnership with the ESRB, to be responsible for identifying contracts that it feels should be subject to mandatory clearing and, further out, for encouraging business offers by European clearing houses to process these contracts. CESR is also looking at criteria for determining the requirement to clear, such as contract standardisation, liquidity and the availability of sufficiently regular and reliable market data to calculate the collateral provided to the clearing house. While the principle of customised OTC-traded derivatives contracts designed to meet the specific risk hedging requirements of companies is accepted, a significant portion of transactions on derivatives markets of all kinds could be steered towards central counterparties. A simple mechanism would provide an incentive: different capital requirements could be set depending on whether the derivative goes through a clearing house.

SET UP CENTRAL DATA REPOSITORIES FOR ALL TRADES

The roadmap set out in the G20 declarations of September 2009 and taken up by the European Council on 2 December 2009 provided for the creation of trade repositories. These are destined to play a key role by recording all transactions to provide transparency on OTC derivatives markets. At present, regulators cannot obtain unconditional, immediate information about trades on derivatives markets. This situation needs to change.

The initial discussions are dealing with defining the objectives assigned to the repositories. Regulators agree that they should be involved in macro-supervision (i.e. supervision of participant positions), but the AMF is lobbying for a more ambitious option. If the disclosures provided by financial institutions are sufficiently detailed, the trades recorded in the repositories could also be used for micro-supervision, to detect market abuse. The trade repository model that currently seems to be favoured by professionals would be suitable only for macro-supervision and would not therefore address the needs of market regulators.

As regards the location of these repositories, it seems inevitable that they should have to be based in Europe. This would be the only way to guarantee automatic access to data formatted according to the needs of local regulators. Otherwise, Europe would have to comply with the access conditions of trade repositories regulated by third parties, which would amount to surrendering sovereignty. Obviously, European regulatory authorities would have to be responsible for authorising and supervising these entities, whether they operate within Europe or globally.

MOVE FORWARD CAUTIOUSLY ON INTEROPERABILITY

In 2007 the Code of Conduct for Clearing and Settlement introduced by European Commissioner Charlie McCreevy recommended interoperability between clearing and settlement systems. This was expected to bring about increased competition, lower prices and ultimately market consolidation. It is important to bear in mind, however, that the code applied solely to equity markets (and moreover has not delivered on all its promises). Because all market regulators have come to the same conclusion, namely that interoperability, which requires systems to be interlinked, markedly increases risk through the potential for contagion. Thus, while the interoperability of cash markets offers undeniable advantages in terms of competition and costs for market participants, the products on these markets are simple and settlement timeframes are fairly short. When it comes to derivative instruments, which have more complex risk profiles and longer settlement times, the risks associated with interoperability increase. LCH Clearnet's regulators conducted an in-depth analysis of the impact of individual linkages between clearing houses and concluded that systemic risk rises sharply with an increase in the interconnectedness of clearing houses (owing to the risks of contagion). In their analysis, they found that the existence of a single link increases liquidity, operational, legal and settlement risk. Multiple links would additionally make it possible for risk to spread to the entire network of clearing houses, with even a greater danger if domestic regulations are incompatible. At this stage, the increased risk that would come with mandatory interoperability is an argument against introducing such a regime for derivatives clearing systems.

ENCOURAGE DERIVATIVES TRADING TO MOVE TO ORGANISED TRADING PLATFORMS

Setting aside the vital question of the mandatory clearing of derivative instruments, it is important in the post-crisis period to consider which methods and venues are appropriate for executing transactions in derivative products. The recommendations by the G20 and the European Commission are clear in this regard: as part of establishing efficient, sound derivatives markets, standardised derivatives should be traded on organised platforms (regulated markets and multilateral trading facilities or MTFs in MiFID-speak) whenever possible. The markets that were structured around organised and active platforms were among those that weathered the crisis most successfully: their liquidity never dried up, even though the cost of liquidity was a substantial decline in the trading value of assets. CESR is looking into this issue and has set up an ad hoc working group.

The issue of trading derivative instruments on organised platforms once again raises the question of standardisation. Much work is being done in this area, particularly by industry (including ISDA).⁸ The benefits and limits of trading on organised platforms vary depending on the types of instrument and participants (notably on their level of sophistication). But in all cases, trading on organised multilateral facilities makes it possible to ensure pre- and post-trade market transparency in the most efficient way that we know. The benefits in terms of the quality of the price discovery and formation process, and in terms of disseminating prices to the market, are immediate and use familiar, well controlled mechanisms. Trading on organised platforms as defined under MiFID is also a way to ensure equal market access, a high level of operational efficiency, and structured monitoring of the execution process (trade confirmation, straight-through processing). Furthermore, experience shows that trade disclosures to regulators (used for supervisory purposes to detect market abuse) are vastly more reliable when done directly by a few organised platforms rather than by a myriad market participants. By capitalising on a tried and tested model and by benefiting from its advantages without major investment, derivatives trading on multilateral platforms can be used to strengthen the transparency and soundness

of derivatives markets, to the benefit of market participants and regulators alike. There have to be exceptions of course, such as for large blocks of contracts that could affect the market, but these should be special cases that are governed by the regulations, provided the contracts in question are sufficiently standardisable and liquid.

MAKE OTC DERIVATIVES MARKETS MORE TRANSPARENT

Given that mandatory and harmonised pre- and post-trade transparency rules currently apply only to equities in Europe, the scheduled review of MiFID should be the opportunity to consider the issue of transparency for other types of financial instruments and to analyse the benefits and impacts, particularly for derivatives contracts. Only appropriate transparency rules that have been tailored to the specific features of these markets will prevent the problems created by the opacity of prices and transactions in these products. Recent events on sovereign debt markets provide evidence, if more were required, of the need to extend the scope of post-trade transparency to derivatives, even though the requirements for implementing transparency must naturally be adjusted to each type of market. Pre-trade transparency provides all participants with the same level of information about orders offered, thus enhancing the quality of the price formation process. Post-trade transparency gives the market an exhaustive view of the trades that have been carried out, which is needed to value products and comply with best execution requirements.

The AMF is participating actively in discussions between European regulators on the transparency of non-equity markets (bonds, structured products, derivatives contracts) within CESR's standing committee on secondary markets. After two reports on the topic published in 2007 and 2009 respectively, the committee of regulators is now considering the definition of the appropriate level of transparency for these different types of products. In their report of July 2009,⁹ European regulators stressed the need to enhance transparency and establish a post-trade transparency regime for credit derivatives markets, and particularly for CDS. Considering that industry-led initiatives in this area had fallen short,

⁸ International Swaps and Derivatives Association.

⁹ "Transparency of corporate bond, structured finance product and credit derivatives markets", CESR/09-348, 10 July 2009.

regulators decided that a mandatory European-level post-trade transparency regime would deliver significant benefits. And indeed, a harmonised transparency regime going beyond the national initiatives currently allowed under MiFID would make it possible to measure the level of credit risk transfers and promote liquidity on these markets, which provide a pricing yardstick for other financial instruments. CESR therefore recommended that the European Commission legislate to this effect and establish a mandatory and appropriate post-trade transparency regime for derivatives markets. Today, the committee is working on a more accurate definition of the appropriate level of transparency for these products. It recently published a new consultation paper that proposes setting the parameters for an appropriate post-trade transparency regime for non-equity markets, notably the CDS market, including which information to publish and within what timeframe. The paper also asks a number of open questions in a bid to gauge the appropriate level of pre- and post-trade transparency on other derivatives markets, including interest, equity, currency and commodity derivatives markets. The Commission will use these recommendations as a basis for its deliberations during the MiFID review.

But aside from the question of reforming MiFID, a more ambitious post-trade transparency regime is possible. Why not use the trade repositories to provide all market participants with information about the terms on which trades are carried out?

4 | A BROADER OVERHAUL OF OTC DERIVATIVES MARKETS REGULATION AND A NEW KIND OF GOVERNANCE FOR OTC MARKETS

Beyond the current work being done with the specific goal of regulating OTC derivatives markets more effectively, it is important to make sure that the overall European legislative framework fully reflects the presence of derivatives markets, notably by ensuring that market abuse on derivatives markets

does not go unpunished. More generally, current developments in the regulation of OTC derivatives markets should be extended to commodity derivatives markets, and should lead to a broader reflection on the regulatory principles to be applied to OTC markets.

FIGHTING MARKET ABUSE

To be effective on these markets, regulators must have access to information on trades on OTC derivatives markets so that they can detect cases of market abuse and punish breaches. Without waiting for the creation of European and international trade repositories and Europe's post-trade legislation, European regulators have already agreed to exchange data on OTC trades through the Transaction Reporting Exchange Mechanism (TREM) introduced under MiFID for equities. CESR held a consultation on the arrangements for reporting these transactions in the early part of the year,¹⁰ and the committee will release final guidelines in summer 2010. CESR will also propose to the Commission that, as part of the MiFID review, it should take away the option given to Member States of not requiring transactions in financial instruments other than equities to be reported, instead making such disclosures mandatory.¹¹ The instruments covered by the reporting arrangements are derivatives whose underlyings have been admitted to trading on a regulated market. In other words, interest rate, currency and commodity derivatives are excluded at this stage.

The Market Abuse Directive, which provides appropriate means of deterrence and penalties to combat certain types of behaviour, such as insider trading and market manipulation, also needs to be reviewed. Revising MAD will provide an opportunity to clarify the framework applicable to transactions on OTC derivatives markets. The review will look at the scope of markets and financial instruments covered by MAD, but it could also consider questions that are specific to certain markets, such as the disclosure of privileged information on commodity markets, in connection with current discussions on sector regulation.

¹⁰ CESR Consultation on guidance to report transactions on OTC derivative instruments, 09-987, January 2010.

¹¹ For now, only the United Kingdom, Ireland and Spain collect data on transactions on OTC-traded derivatives.

REGULATING COMMODITY DERIVATIVES MARKETS

Commodity derivatives also need to be included in initiatives to make derivatives markets more secure, while taking account of their specific qualities.

Commodity derivatives markets are of vital importance to farming and to certain sectors of industry. Accordingly, it is important to ensure that they function properly, including by creating an incentive to standardise the most common OTC contracts as far as possible so that they can be cleared and traded on organised markets.

At the same time, OTC commodity derivatives present a challenge to standardisation because of the wide diversity of underlyings both in terms of physical products (from crude oil to cereals) and geographical location (which determines transport costs). These qualities are behind the difficulties inherent in supervising these markets, which are diverse, decentralised and hence often non-transparent. The need to cover derivatives markets as well as, where possible, related physical markets, further complicates matters; yet dual supervision is vital to detect and punish abuse, especially manipulation.

Given the current legal and technical powers of the financial regulator, the supervision of commodity derivatives markets also presents challenges from an institutional architecture perspective. In some cases, the financial regulator will have to cooperate with a sector regulator that may have more or less extensive powers over the underlying physical markets (electricity and gas for example). In other instances (oil, metals, etc.), there is no regulator as such in Europe, but various public authorities (ministry, competition authority) have information about the functioning of physical markets. Whatever the situation, the challenge is to take a pragmatic approach to defining the boundaries of each regulator's powers and the terms for cooperation between the market regulator and other authorities to ensure that the market in question is properly supervised.

The third challenge involves developing these markets to address existing or future hedging needs of economic agents. This is particularly evident in farming, where changes to the Common Agricultural Policy will require sustained

and coordinated efforts to make sure that farmers and food industries have access to appropriate and effective risk management tools. Organised and OTC derivatives markets alone cannot control the risks that are part of farming, but they should play their role in this regard to the full. The AMF will contribute to the development of these markets, while keeping a close watch to ensure their integrity, for the benefit of all participants.

A NEW KIND OF GOVERNANCE FOR OTC MARKETS

MiFID was primarily designed to reflect the way that equity markets function. Some provisions, such as those pertaining to key MiFID concepts such as "orders" and "best execution", are not easily applied to OTC derivatives markets. The MiFID review should be the opportunity to clarify the way that certain provisions apply to markets in instruments other than equities. The crisis has shown that we have to reassess client categorisations to limit the risk that complex OTC-traded products might be improperly marketed (information gaps, unsuitable products).

But beyond the question of adapting the directive to OTC derivatives markets, it is necessary to take a deeper look at market developments, and particularly the place of OTC markets within the financial system. For although discussions are now being held (thanks to impetus from the G20) on mandatory clearing for OTC derivatives and their trading on organised platforms where possible, the momentum is in the other direction in equity securities – a situation that is seemingly causing little fuss for now. MiFID's entry into force three years ago was accompanied by a sharp increase in OTC transactions. While there may be questions over the quality of the statistics published on these trades, it is generally accepted that approximately 40% of all transactions¹² in equities admitted to regulated markets in the European Economic Area are OTC, with the remaining 60% being divided between regulated markets and MTFs. These OTC transactions, which are not subject to any pre-trade transparency requirements, are generally published in real time but publication delays of up to three days are possible when an intermediary executes a client order on own account.

¹² *In volume terms.*

To the extent that MiFID defines OTC trades by default only, i.e. as transactions that are not carried out on regulated markets or MTFs, these transactions cover a diverse range of situations, from the cash leg of a transaction with a derivative component to the simple matching of client orders within banks' internal crossing networks.

The forthcoming MiFID review should provide an opportunity to establish a framework for some of these transactions, notably by creating a proper status for crossing networks. The origin of certain types of OTC transactions should also be better identified when they are published. However, unless we are willing to accept that regulation is always

made in hindsight, as new forms of OTC trading emerge we have to be more ambitious if we want to do a better job of managing the growing share of these OTC transactions. Negotiators could work towards a "positive" definition of what is meant by OTC, which could cover only transactions that by virtue of their specific characteristics and purely bilateral nature would never be traded on platforms or contribute to the price discovery mechanism. Block trades might be an example. For it is by directing the maximum number of orders to transparent trading venues that we will enhance the quality of the price discovery and formation mechanism. And the quality of the price formation process is what determines the efficiency of derivatives and cash markets alike.

While preparations for establishing a coherent regulatory framework for derivatives markets are underway thanks to impetus from the G20, few proposals have been translated into legal or regulatory provisions and many technical details have yet to be hammered out. The political pressure must be kept up, to prevent the substance of these proposed rules and regulations from being gradually removed during the drafting process. This is a challenge for all regulators, who have a shared interest in making parallel, if not convergent, progress on this issue, to avoid discrepancies in regulation that would be detrimental to the most virtuous financial centres.

An industrial organisation approach to the too-big-to-fail problem

JEAN-CHARLES ROCHET

Professor of Banking

Swiss Finance Institute – University of Zurich and Toulouse School of Economics

This article suggests a reform of the organisation of money markets that would largely eliminate the risk of contagion. The notion of “systemically important institution” would be replaced by that of systemically important platform”. Such platforms would only be directly accessible to a group of “officially recognised financial institutions” that would have to comply with special regulatory requirements and would be directly supervised by the central bank. The status of “officially recognised financial institution” could be revoked by the central bank if these special regulatory requirements are not satisfied. A special resolution procedure would be created for these institutions, so that the central bank has the legal powers to close it down, or at least restrict its activities before it is too late. OTC markets would still be active but, since they would be penalised by regulation, it is likely that they would become small, and therefore not in a position to jeopardise the entire system.

NB: This paper is closely inspired of a text with the same title that was prepared for the Federal Reserve Bank of Boston 54th Economic Conference, October 21-23, 2009, and my article “Regulating systemic institutions” published in the Finnish Economic Papers (2009), 22(2).

This article puts forward a simple reform that could lead to the elimination – once and for all – of the too-big-to-fail (TBTF) problem, which is the most frightening issue currently on the regulatory agenda. Indeed, the main lesson that can be drawn from the actions taken (and statements made) by public authorities during this crisis is that, in the future, *any large financial institution that encounters financial problems can expect to be bailed out by public authorities on the grounds that it is TBTF* (alternative terms are too-interconnected-to-fail,¹ Large and Complex Banking Organisation – LCBO or Systematically Important Financial Institution – SIFF). The turmoil that followed the failure of Lehman Brothers in September 2008 has indeed led politicians to believe they had to commit to an unconditional support of any troubled financial institution whose failure might create major disruptions. Of course this commitment is a disaster in terms of moral hazard and market discipline. From a forward looking perspective, public authorities could not convey a worse message to market participants and bank managers.

A similar pattern emerged after the Continental Illinois bail-out in 1984,² and at the time, it took more than five years for market discipline to be somewhat restored.³ But this bail-out was a single event, and the Comptroller of the Currency of the time tried to maintain, as much as he could, some ambiguity on which banks were really TBTF.⁴ This time all ambiguity has been resolved in a dramatic way: all large financial institutions will always be rescued. Public authorities of G20 countries have even agreed to publicly commit to a systematical bail-out. Unless resolute reforms are undertaken, it will probably take a very long time to restore market discipline again. Moreover an indirect outcome of the crisis was an increased concentration of the banking systems of many countries, the surviving banks becoming even bigger than before and in some countries at least, close to be too-big-to-be-bailed-out.

In a premonitory book, Stern and Feldman (2004) rightly identified TBTF as a major regulatory issue and proposed a whole range of policy measures in order to fix it. The reform proposed here is complementary to their policy recommendations, but I view it as a priority. It is in some way radical, but fits very well into the general movement toward relying more on central counterparty clearing for interbank trading and derivatives markets.

Another major source of concern for public authorities is the complete lack of resiliency of interbank and money markets during the recent crisis. It is amazing how some shocks to the relatively small subprime market could lead to the complete dry-up of liquidity markets for more than a year. This paper argues that this lack of resiliency is due to a fundamental mistake in the way these markets were conceived. To a large extent, the contagion that took place on these markets was the necessary outcome of the passive attitude of banking supervisors, who have let large banks develop an enormous and opaque nexus of bilateral obligations. In Rochet and Tirole (1996), Jean Tirole and I explored the theoretical justifications of such a decentralised organisation of the interbank markets and found only one possible answer: market discipline. More precisely we found that the only possible explanation why prudential authorities have let banks organise the trade of their reserves vis-à-vis the central bank in an over-the-counter (OTC) fashion was the desire to promote what we called *peer monitoring* i.e. the mutual surveillance of banks by their competitors. However the price to pay for this mutual surveillance is the risk of contagion. Market discipline only works if public authorities can convince market participants that they will not intervene if a systemic crisis occurs, which is obviously not credible.

A logical consequence of this result, which we did not defend forcefully enough in Rochet and Tirole (1996), is that the current, decentralised, organisation of interbank markets has a huge cost (contagion risk)

¹ Perhaps a more appropriate wording is too-politically-connected-to-fail.

² In May of 1984, Continental Illinois was bailed out by the US Federal Government. It was only the 7th largest bank in the United States, but it was a money center bank holding large deposits of hundreds of smaller banks. US supervisors feared that its failure could propagate toward many of these smaller banks. The Comptroller of the Currency engineered a rescue that bailed out not only bank depositors but also uninsured creditors of the bank holding company. When called to testify by the Congress, the Comptroller admitted that other large banks might warrant similar support. Congressman McKinney uttered the now famous phrase: "Mr. Chairman, We have a new kind of bank. It is called too-big-to-fail, TBTF, and it is a wonderful bank." (Hearings before the Subcommittee on Financial Institutions, 1994, cited by Morgan and Stiroh, 2005).

³ Flannery and Sorescu (1996) show that banks' debt spreads only started reflecting default risks around 1989, after a regulatory transition toward letting market participants share the losses when a banking firm fails.

⁴ See Morgan and Stiroh (2005).

but no benefit. Market discipline does not work for the interbank market, not only because of the strong likelihood of a public bail-out in case of a crisis but also because of the faulty conception of its industrial organisation. Decentralised trading of bank reserves has a major drawback: it bundles liquidity risk with counterparty risk, which makes price discovery almost impossible.

The plan of the rest of this article is the following. Section 1 puts forward the view that public authorities should protect markets not banks. Section 2 presents, in a non technical way, the theoretical analysis of the choice between centralised trading and systemic risk.

1| PROTECTING PLATFORMS, NOT BANKS

The main objective of macro-prudential regulation should be to protect platforms (i.e. vital parts of financial infrastructure) not individual banks! Many central banks are given the rather vague objective of "maintaining financial stability", which gives them too much discretion and opens the door to lobbying by large institutions and political pressure. This could be limited if central banks were given a more precise mandate. The one I propose here is to *guarantee the integrity of a precise list of financial markets and infrastructures that are deemed "vital"*: interbank (both secured and repo) markets, money markets, as well as some derivative markets and large value payment systems. To do so, it would be useful to learn from the experience of private clearing houses, which have developed sophisticated policies for protecting themselves against the failure of their participants.

Many commentators have argued that the lack of transparency of interbank exposures on money markets and derivatives have played a major role in the propagation of the crisis. OTC transactions are typically very opaque and can be a major source of systemic risk. Secretary Geithner has fostered the development of central clearing platforms for credit derivatives. Along the same lines, a recent paper by Pennachi (2009) discusses deposit insurance-related reforms that would improve the efficiency

of the financial system. The first reform he identifies is "to mitigate TBTF by reducing counterparty risk via centralised clearing (and possibly exchange-trading) of derivatives. See also Bernanke (2009): "To help alleviate counterparty credit concerns, regulators are also encouraging the development of well-regulated and prudently managed central clearing counterparties for OTC trades. Just last week, we approved the application for membership in the Federal Reserve System of ICE Trust, a trust company that proposes to operate as a central counterparty and clearinghouse for CDS transactions."

Bernanke (2009) puts forward a similar proposal for repo markets: "Enhancing the resilience of the tri-party repurchase agreement (repo) market, in which the primary dealers and other major banks and broker-dealers obtain very large amounts of secured financing from money market mutual funds and other short-term, risk-averse sources of funding. For some time, market participants have been working to develop a contingency plan for handling a loss of confidence in either of the two clearing banks that facilitate the settlement of tri-party repos. Recent experience demonstrates the need for additional measures to enhance the resilience of these markets, particularly as large borrowers have experienced acute stress. The Federal Reserve's Primary Dealer Credit Facility, launched in the wake of the Bear Stearns collapse and expanded in the aftermath of the Lehman Brothers bankruptcy, has stabilised this critical market, and market confidence has been maintained. However, this program was adopted under our emergency powers to address unusual and exigent circumstances. Therefore, more-permanent reforms are needed. For example, it may be worthwhile considering the costs and benefits of a central clearing system for this market, given the magnitude of exposures generated and the vital importance of the market to both dealers and investors."

My proposal would go further by extending the centralised model not only to derivatives and repo markets but also to unsecured interbank markets: I believe that more centralisation could be an efficient way to stabilise interbank markets: for example, banks would be offered the choice between a centralised market for liquidity, which would be insured and supervised by the Central Bank, and OTC transactions that would remain risky and,

as such, associated with regulatory capital charges. As for money markets, it should be possible to move also toward more centralisation. As Bernanke puts it (2009): "In light of the importance of money market mutual funds – and, in particular, the crucial role they play in the commercial paper market, a key source of funding for many businesses – policymakers should consider how to increase the resiliency of those funds that are susceptible to run. One approach would be to impose tighter restrictions on the instruments in which money market mutual funds can invest, potentially requiring shorter maturities and increased liquidity. A second approach would be to develop a limited system of insurance for money market mutual funds that seek to maintain a stable net asset value."

In its study on the safety and efficiency of derivatives markets, the Commission of the European Communities (2009) states that "CCP clearing is the most effective way of reducing credit risk and is broadly feasible in all market segments" and rightly points that "the near collapse of Bear Sterns in March 2008, the default of Lehman Brothers on September 15, 2008, and the bail-out of AIG on the next day highlighted the fact that OTC derivatives in general and credit derivatives in particular carry systemic implications for financial markets. The three institutions mentioned above were important players in the OTC derivatives market, either as dealers or users of OTC derivatives or both."

The guiding principle of central counterparty (CCP) clearing is that after two parties have agreed on a trade, the clearing platform steps into each trade by acting as counterparty to each side. This is called novation, a mechanism by which the platform essentially becomes "the buyer to every seller and the seller to every buyer". This mechanism allows the netting of multilateral (not only bilateral) exposures but also the centralisation of collateral, which introduces diversification effects, especially if there is some degree of cross-pledging between different types of markets.

To reduce the risk and possible consequences of a default by a clearing member or one of its customers, CCPs have developed several risk management procedures. The primary protection is provided by *initial margin*, a deposit which clearing members are required to place in an account with the CCP.

CCPs typically also make margin calls to ensure that they remain protected over time as prices change. They usually also have access to additional default resources, such as mutual guarantee funds or insurance cover, and require clearing members to fulfill financial requirements to reduce the likelihood of default.

To protect themselves and the clearing house against client defaults, members are generally required to set a minimum level of margin for their clients according to rules set down by the clearing house. De facto, CCP failures have been extremely rare. Knott and Mills (2002) find only three cases: Paris in 1973, Kuala Lumpur in 1983, and Hong Kong in 1987.

In principle, CCPs mark-to-market positions are daily. Thus they should be exposed only to the extent that a one-day price movement exhausts the entire margin of a clearing member. In practice, CCPs may be exposed over a longer period as it may take time to decide whether a member should be declared in default, and then to close-out positions. Several studies have attempted to quantify the potential exposure of clearing houses over one or more days. Some of these models are purely statistical, and pre-specify acceptable coverage levels in a purely exogenous fashion. By contrast, Fenn and Kupiec (1993) develop a model that aims at minimising the total sum of margin, settlement costs and the cost of settlement failure. Clearing houses need to trade-off several objectives when they set their margins. Requiring high margins and good quality collateral is costly to members. Marking positions to market and settling gains or losses, on either a daily or more frequent basis, also entails costs. To arrive at an optimal margin level the clearing house must balance these costs against the potential losses resulting from a default of contracts.

By helping to manage counterparty risk and by providing netting services, CCPs allows market participants to economise on collateral, compared to what they would otherwise need to hold to ensure equivalent protection in bilaterally cleared markets. Regulators also often recognise the reduction in counterparty risk by allowing clearing members to hold less capital than if they were exposed directly to other market participants. Clearing members may also reduce the resources spent on monitoring individual counterparties, insofar as their actual

counterparty is the CCP. *Through the design of clearing members margining and collateral requirements, CCPs reduce the probability of immediate propagation to solvent members of losses incurred by the insolvent one.*

Moreover a CCP clearly improves transparency, which explains why reforms are often resisted by those currently enjoying an information advantage (i.e. major OTC derivatives dealers). As exemplified by the Lehman failure, when a major player in bilaterally cleared derivatives markets fails, it is not immediately apparent to the remaining market participants who are absorbing the losses, how big they are and how the failed firm's counterparties are affected. The effects of this uncertainty can be devastating on market confidence, as illustrated by Bear Sterns, Lehman and AIG. This uncertainty is mitigated by a CCP that has effective means of allocating losses and no incentive to use the information it holds for its own profits. This neutrality alleviates the information concerns of market participants. A CCP also increases operational efficiency, by centralising the monitoring of trades and reducing potential for disputes.

CCPs have proven to be resilient even under stressed market conditions as the one we are facing today and showed their ability to ensure normal market functioning in case of failure of a major market player. A case in point is the successful unwinding of the interest rate swap positions left open following the default of Lehman Brothers. This was engineered by LCH.Clearnet, who operates SwapClear, currently the dominant provider of CCP clearing services for interest rate swaps. Lehman's USD 10 trillion portfolio of 66,000 trades across five currencies was replaced and less than 50% of Lehman Brother's initial margins was required to hedge the risk, manage and auction the position.

Typically, private clearing houses distinguish between their members, who have a privileged status, and ordinary participants. In counterpart to their privileged status, the clearing members are supposed to implement a set of risk mitigation policies, such as collateral and capital requirements and bilateral credit limits. For example members are typically required to make an upfront deposit to a default fund supposed to cover losses that exceed the defaulting member's margins. I believe central banks could adopt a similar policy, and

condition the direct participation of financial institutions to the "vital" part of the financial infrastructure on special requirements (such as solvency and liquidity requirements) that would go beyond the standard requirements imposed on deposit taking institutions by micro-prudential regulators.

In effect, my proposal would aim at replacing the notion of "systemically important institution" by that of "systemically important platform." Such platforms would only be directly accessible to a group of "officially recognised financial institutions" that would have to comply with special regulatory requirements and would be directly supervised by the central bank. The status of "officially recognised financial institution" could be revoked by the central bank if these special regulatory requirements are not satisfied. A special resolution procedure would be created for these institutions, so that the central bank has the legal powers to close it down, or at least restrict its activities before it is too late. Again this is in line with the position recently expressed by Chairman Bernanke (2009): "The United States also needs improved tools to allow the orderly resolution of a systemically important nonbank financial firm, including a mechanism to cover the costs of the resolution. In most cases, federal bankruptcy laws provide an appropriate framework for the resolution of nonbank financial institutions. However, this framework does not sufficiently protect the public's strong interest in ensuring the orderly resolution of non-depository financial institutions when a failure would pose substantial systemic risks. Improved resolution procedures for these firms would help reduce the too-big-to-fail problem by narrowing the range of circumstances that might be expected to prompt government intervention to keep the firm operating."

These "officially recognised financial institutions" would be the equivalent of existing "systemically important institutions", who have access to special liquidity assistance facilities and possible government guarantees in case of distress. But there would be an important difference: it is the central bank that would choose who belongs to the club and who does not! If the advantages associated with membership far exceeded the costs, the threat of revoking the status would work as an important disciplining device. OTC markets would still be

active but, since they would be penalised by regulation, it is likely that they would become small, and therefore not in a position to jeopardise the entire system.

2 | INTERBANK LENDING AND SYSTEMIC RISK

In an article published in 1996, Jean Tirole and I analysed the trade-offs involved in the management of systemic risk on interbank markets. This section summarises, in a non-technical fashion, the main conclusions of our analysis, which already contained the main elements of what I call today the "Industrial organisation approach" to the TBTF problem.

A first, important, remark is that systemic risk is a concern only in a decentralised environment in which banks incur credit risk in their mutual transactions. Like in many crises of the past, governments have tried to resolve the current crisis (*ex post*) by insuring most of interbank claims, rescuing distressed banks through discount loans, the facilitation of purchase-and-assumptions, nationalisations, and so forth. However, such policies do not provide proper (*ex ante*) incentives for interbank monitoring and may lead to substantial cross-subsidies from healthy banks to frail ones through a government-mediated mechanism. An alternative method of prevention of systemic risk would consist in centralising banks' liquidity management. The Fed funds market could be organised as an anonymous double auction (to which the central bank could participate to manage global liquidity), in which each bank would trade with the central bank rather than with other banks. The central bank would then have better control over interbank positions and would further prevent systemic risk on the interbank market. Last, bank transactions on derivative markets could be protected through sufficient collateral so that, again, banks would not grant each other credit. Whether the government is affected by a bank failure in a centralised system depends on the constraints it puts on banks, but, in any case, centralisation, like insurance, eliminates systemic risk.

The current system of interbank linkages suffers from its hybrid nature. On one hand, banks engage in largely decentralised mutual lending. On the other hand, government intervention, voluntary or involuntary, destroys the very benefit of a decentralised system, namely, peer monitoring among banks. If one does not believe that the social value of the fine information that banks have or may acquire about each other exceeds the cost of systemic risk, then there is no particular reason to encourage decentralised interactions among banks. To stress the point that a decentralised operation of interbank lending must be motivated by peer monitoring, consider the following (alternative) plausible explanation of interbank lending. Some banks, perhaps due to their regional implantation, are good at collecting deposits, but have poor investment opportunities. In contrast, some other banks, such as the money center banks, have plenty of such opportunities or else are sufficiently large to afford the large fixed costs associated with complex derivative and other high-tech financial markets. It then seems natural for the former banks to lend to the latter. Yet, that a deposit-collecting bank should incur a loss when the borrowing bank defaults, as is implied by interbank lending, is not a foregone conclusion. If the relationship between the two banks involves a transfer of funds but no monitoring, the operation described above could be implemented in a more centralised, and probably better for prudential control, way. Namely, the deposit-collecting bank could pass the deposits on to the borrowing bank, while continuing to service them (in the same way a bank may continue to service mortgage loans it has securitised without recourse to other banks). The key difference with the interbank-loan institution is that the deposits made at the originating bank would, except to the eyes of the depositors, become deposits of the receiving bank. So, if the latter defaulted, losses would be borne by the deposit insurance fund, and not by the originating bank. We conclude that a mere specialisation of banks into deposit-taking banks and actively investing banks by itself does not lead to the existence of decentralised interbank lending.

One of the key messages conveyed by Rochet and Tirole (1996) is that the flexibility afforded by

decentralised interbank transactions can only be justified by banking regulators' desire to promote effective peer monitoring by banks. However the current crisis has shown that the cost of encouraging this peer monitoring, namely allowing the possibility of a systemic crisis was far bigger than the potential benefit of this peer monitoring, especially given the

impossibility for public authorities not to bailout large insolvent institutions. Therefore centralising the payment system, the Fed funds market, and other markets in which banks currently have bilateral exposures would result in an equally efficient allocation of liquidity among banks and would facilitate prudential control.

Confronted with an unprecedented freezing of interbank and monetary markets after September 2008, central banks have reacted by assuming a large part of the intermediation of liquidity flows among banks, and de facto becoming the clearing houses for the unsecured and for the collateralised interbank markets. A natural question is when this "temporary" situation will cease and when interbank markets will "go back to normal".

Similarly, governments have felt obliged to set up extremely wide bailout packages including public recapitalisations, purchase of toxic assets, and subsidised lending to distressed institutions. When is this "exceptional" situation supposed to terminate and what policies are supposed to be implemented, in the future, for dealing with TBTF institutions?

The response to these questions that is put forward in this paper may seem radical, but it is reasonably simple. The main idea is to reverse the balance of power between large banks and supervisors. Instead of letting some banks grow big and opaque enough to constitute a threat to the financial system, my proposal is to let the central bank, as the systemic risk supervisor, decide which banks are safe enough to be allowed as members of the financial "platforms" that are deemed vital for the economy: large value payment systems, unsecured and collateralised interbank markets and some derivative markets. The central bank would receive an explicit mandate for guaranteeing the continuity of these platforms and for regulating membership.

If the advantages associated with membership to these platforms far exceeded the costs, the threat of revoking the member status would work as an important disciplining device. OTC markets would still be active but, since they would be penalised by regulation, it is likely that they would become small, and therefore not in a position to jeopardise the entire system.

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OTC derivatives: financial stability challenges and responses from authorities

DANIELA RUSSO

*Director General of the Directorate General Payments and Market Infrastructure
European Central Bank*

The importance of well-functioning over-the-counter (OTC) derivatives markets for financial stability was highlighted during the financial market turmoil, when significant shortcomings in risk management and market transparency were exposed. In response to these experiences, public authorities have launched a series of measures to strengthen OTC derivatives markets. This article provides an overview of this work. It explains the significance of well-functioning OTC derivatives markets and discusses the main lessons from the financial crisis regarding the need to strengthen their resiliency and transparency. Then, we describe the main tools under consideration, relating to the use of sound market infrastructures – central counterparties and trade repositories –, enhanced bilateral risk management as well as to cooperation between regulators and overseers of infrastructures and banking supervisors. We finally describe the state of play of the main initiatives within these areas.

The importance of well-functioning over-the-counter (OTC) derivatives markets for financial stability was highlighted during the financial market turmoil, when significant shortcomings in risk management and market transparency were exposed. In response to these experiences, public authorities have launched a series of measures to strengthen OTC derivatives markets. This article provides an overview of this work. Section 1 explains the significance of well-functioning OTC derivatives markets, while section 2 discusses the main lessons from the financial crisis regarding the need to strengthen their resiliency and transparency. Section 3 describes the main tools under consideration, relating to the use of sound market infrastructures, enhanced bilateral risk management as well as to cooperation between regulators and overseers of infrastructures and banking supervisors. Section 4 describes the state of play of the main initiatives within these areas.

1 | THE IMPORTANT ROLE OF OTC DERIVATIVES MARKETS

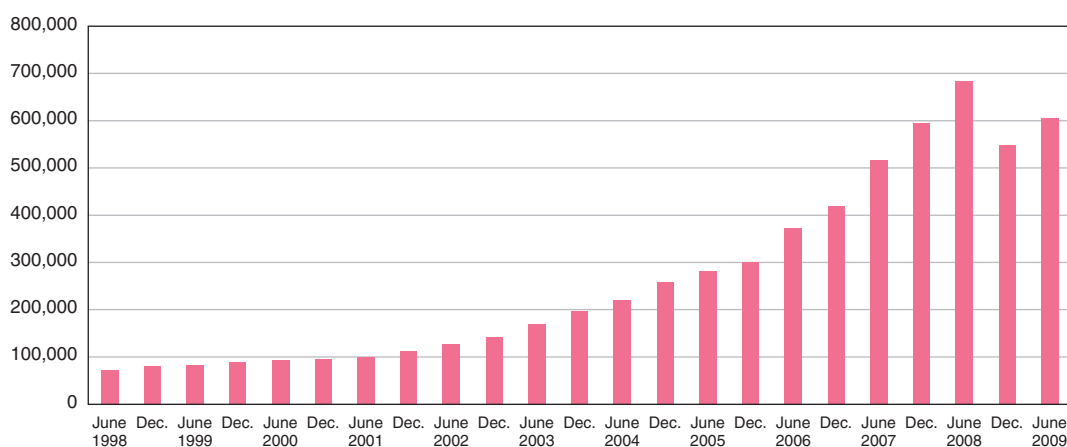
Derivatives have an important function for the economy and the financial system. On the one hand, derivatives can have a welfare improving effect. In particular, they can contribute to enhanced risk management, e.g. by redistributing risks to those market participants who are most willing and able

to deal with them, by enabling the transfer of the economic risks of assets without the transfer of the legal rights and obligations pertaining to the underlying assets, and by facilitating the targeted hedging of risk exposures. Derivatives can also broaden investment opportunities by enabling participation in financial markets with only small financial investments and at higher speed and lower transactions costs than for direct investments in the underlying. Finally, they can support overall market efficiency by exploiting price differences between derivatives and cash markets. On the other hand, however, derivatives may also be a source of systemic risk. For instance, they enable the increased leveraging of market participant's portfolios and may, in case that the resulting exposures are not matched by appropriate risk management, imply higher net risks for the financial system. Given that derivatives are largely traded between major financial institutions through bilateral contracts, they can also raise contagion risk in the financial sector, with potential financial stability implications. Finally, by taking advantage of arbitrage opportunities between financial markets, they also render the stability of these markets much more interdependent.

Derivatives that are traded OTC have some characteristics that make them even more critical from a systemic risk perspective. First, given the bilateral nature of trading, there is no central place where OTC trades are captured and handled. The effective monitoring of market activities is therefore more difficult and effective risk management may

Chart 1
OTC derivatives: notional amounts outstanding

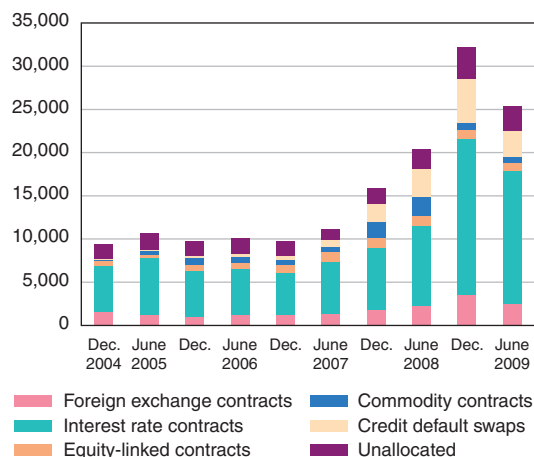
(USD billions)



Source: BIS

Chart 2
OTC derivatives: gross market values

(USD billions)



Source: BIS

be hampered by different or even inconsistent practices. Second, OTC derivatives are instruments tailored to the needs of the relevant counterparties. Accordingly, their risk profile can be very unique and their implications for the overall distribution of risks across the financial system can be difficult to determine. Third, trading volumes have reached very large levels, with an enormous growth rate especially during recent years. For example, between June 2005 and June 2008 the overall market size doubled, reaching approximately USD 684 trillion in June 2008. In some market segments, growth was even more pronounced. For example, during the same period the nominal amounts outstanding of credit default swaps (CDSs) more than quintupled, from about USD 10 trillion to about USD 57 trillion. The turmoil brought about a first period of decline in market volumes since 1998, although they stabilised at high levels: in June 2009 total market volumes and CDS volumes stood at USD 600 trillion and USD 36 trillion respectively. While the actual payment flows at risk, approximated by gross market values,¹ amounted to only USD 25 trillion for all OTC derivatives and USD 3 trillion for CDS, these are still very substantial figures especially in view of the particularly high degree of market concentration and interconnectedness.² Charts 1 and 2 illustrate the development of OTC derivatives markets.

2 | POLICY PRIORITIES: STRENGTHENED RESILIENCY AND TRANSPARENCY

The financial crisis has brought OTC derivatives to the forefront of regulatory attention. The near-collapse of Bear Stearns in March 2008, the default of Lehman Brothers on 15 September 2008 and the bail-out of the American International Group (AIG) on 16 September 2008 highlighted the significant financial stability implications of OTC derivatives markets in general and CDS markets in particular.

In particular, the case of Lehman Brothers allows to clearly illustrating the relevance of adequate and resilient infrastructure. Lehman was a global company with business in a large number of markets across the globe. However the effects of the Lehman default were not the same in the different markets where the group was an active player.

In *OTC derivatives markets*, Lehman Investment Bank was both a major player and a reference entity. At the occurrence of the default, no precise information was available about the volumes of the concerned trades and the net amounts that would be lost on Lehman's own CDS obligations or be required to settle contracts referencing Lehman's debt. Given the high degree of market concentration and the corresponding size of the potential exposures of some major financial institutions, the possible repercussions for the already troubled banking system and strained market liquidity were deemed to be significant. The absence of established cash settlement procedures in the event of the failure of a major market player and reference entity further exacerbated the situation. Indeed, there were strong indications that this uncertainty, originating in a relatively small market segment, affected financial markets more broadly, including the money market where it contributed to precautionary hoarding behaviour of market participants. The corresponding market turbulences only abated once the main CDS dealers had netted their outstanding positions relating to CDS contracts to which Lehman had been counterparty and had determined in a joint

¹ Gross market values represent the replacement costs of existing OTC derivatives contracts, without taking into account existing legally enforceable bilateral netting agreements or the collateralisation of positions.

² See ECB (August 2009).

auction the recovery rate for the cash settlement of CDS contracts referencing Lehman. More than one month after Lehman's default a total of about USD 5 billion in net payments were made in settling these positions.³ The market data presented in the above charts 1 and 2, highlighting declining overall market volumes accompanied with higher risk metrics in terms of gross market values during the second half of 2008, provide an indication of the relevance of the Lehman's default for OTC derivatives markets.

In *foreign exchange and repo markets*, Lehman was also major counterparty, acted as issuer of financial instruments (including of various structured products), as well as a settlement agent, custodian and/or collateral provider. However, contrary to the situation on CDS markets, on these other affected financial markets, financial infrastructures were available to manage the Lehman default. While central counterparties (CCPs) needed to carefully assess and disentangle a large number of positions of Lehman (not uncommonly intra-group in nature) and to unwind, hedge, liquidate and transfer millions of positions of their participants and clients at a scale of complexity never experienced before, they were generally able to complete these operations largely without losses.⁴ The benefits of financial market infrastructures in dealing with the Lehman case also were apparent in the foreign exchange market, where the ability of Continuous Linked Settlement System – CLS – to continue to settle the positions of Lehman effectively limited the impact of the insolvency. Overall, the solid performance of financial market infrastructures in managing Lehman's default contrasted starkly with the respective disruptive bilateral processes in CDS markets, notably due to the absence of adequate market infrastructures for these products.

In the light of these events, there is a need to address two main weaknesses of OTC derivatives markets. While during the financial crisis these were most evident with regard to CDS, there is broad agreement that the underlying structural deficiencies affect OTC derivatives markets in general and therefore need to be tackled across asset classes.

First, the transparency of OTC derivatives markets must be enhanced. Given the bilateral nature of OTC derivatives transactions, it is much more difficult for

both public authorities (such as central banks, market surveillance authorities and banking supervisors) and market participants to adequately monitor the building up of exposures and to assess potential risks for financial stability and market integrity than it is the case for exchange-traded and/or centrally-cleared financial transactions. This hampers the ability of both public authorities and market participants to take timely action in response to emerging financial vulnerabilities. Furthermore, the opaque nature of OTC derivatives markets hampers effective risk management and also gives rise to uncertainty, with a significant potential for an erosion of market confidence namely during distressed market conditions.

Second, risk management for OTC derivatives must be improved. The financial turbulences highlighted that market participants had insufficient capabilities for measuring and monitoring counterparty and liquidity risks, especially in view of the particular complexity of OTC derivatives products, the high degree of interconnectedness among major financial institutions, and the more limited liquidity of these markets, as evidenced in the sizable losses incurred during the Lehman default. Differences in risk management across financial institutions created additional difficulties. Furthermore, lack of standardisation and automation of processes created significant operational risks and processing backlogs, adding to market uncertainty.

3| TOOLS: SOUND MARKET INFRASTRUCTURES, IMPROVED BILATERAL RISK MANAGEMENT AND COOPERATION AMONG AUTHORITIES

3|1 Sound market infrastructures

CENTRAL COUNTERPARTIES

The use of central counterparties (CCPs) for OTC derivatives brings a number of significant benefits

³ See Feder (I.), Frankel (A.) and Gyntelberg (J.) (2008).

⁴ See CCP12 (2009).

as compared to the settlement of gross transactions or bilateral clearing. First, CCPs' risk management is particularly robust, based on several highly sophisticated and technically advanced tools to monitor and manage risks (e.g. membership, margining and collateral requirements), including tools for loss sharing in case of the potential default of one its members, which are obviously not available in case of risk management by banks. Second, by interposing itself as buyer to every seller and seller to every buyer among its members, CCPs reduce the direct bilateral interconnectedness between major financial institutions, thereby providing an important contribution to limiting contagion risk in the financial system. Third, central clearing has a positive effect on market liquidity as a result of multilateral netting which reduces the number of settlements as well as associated risks and costs. Fourth, using a CCP increases operational efficiency as it centralises critical functions such as the calculation of positions, risk management, and settlement of margins and other form of collateral and payments. Finally, central clearing can help to solve some of the problems resulting from information gaps that may impede fully informed risk management and may undermine market confidence.

Despite the pronounced benefits of CCPs for all stakeholders, their services do come at a cost for their users. Private sector efforts alone are therefore insufficient to ensure the adequate use of these infrastructures, but need be complemented by regulatory requirements and incentives. Public sector action is also needed to ensure the safety and soundness of CCPs, given the nature these entities to concentrate counterparty risk and their according systemic relevance. This requires the establishment of robust legal frameworks and close regulation and oversight. The respective measures should be consistent on a cross-border basis to pre-empt scope for regulatory arbitrage and a potential erosion of CCP risk management standards through a competitive race to the bottom among providers. Finally, the various authorities with competence for CCPs, namely securities regulators and central banking overseers, should cooperate very closely in order to fulfil their responsibilities in an effective and consistent manner.

In view of the systemic relevance of CCPs, another important point is to ensure that their operation is fully embedded within the wider financial stability setting, which is still organised predominantly along national lines. In this context the Eurosystem attaches great importance to its long-standing position, as first formulated in its September 2001 Policy line on the consolidation of central counterparty clearing and subsequently reaffirmed by the Eurosystem's Governing Council,⁵ that the infrastructure for the clearing of euro-denominated securities and derivatives should be located in the euro area. This requirement is critical to ensure effective Eurosystem oversight of euro CCPs as well as to monitor and address the potentially pronounced implications of such CCPs for euro area market liquidity especially during distressed market conditions, particularly in view of the corresponding repercussions for the effective exercise of the Eurosystem's core responsibilities for monetary policy and financial stability. It is even more important in view of the role of the euro as a major currency of denomination of OTC derivatives contracts.⁶ The importance of monetary policy concerns relating to CCPs were also recognised by the Ecofin Council in December 2009.

Against this background, the case of the UK-based ICE Clear Europe raises some issues. Since its launch in July 2009, this CCP has cleared the vast majority of euro-denominated CDSs. Moreover, only one of its direct participants is incorporated in the euro area, which implies that for the clearing of euro-denominated CDS euro area banks need to get access to a CCP located outside the euro area through clearing members who are also located offshore. This situation gives rise to Eurosystem concerns as the Eurosystem does not have any direct tools either to access the information necessary to determine whether ICE Clear Europe poses financial stability risks to the euro area or to ensure that the CCP would take appropriate measures to address possible Eurosystem's concerns in this regard. For example it is currently unclear whether ICE Clear Europe has appropriate arrangements to address its potential liquidity needs in extreme but plausible situations, notably in view of its predominantly euro-denominated business and its offshore location.

⁵ See the related Governing Council decisions of 19 December 2008 and 16 July 2009.

⁶ See ECB (September 2009).

TRADE REPOSITORIES

Trade repositories (TRs), registries of OTC derivatives trades, provide an effective tool to mitigate the inherent opacity of OTC derivatives markets through the centralised storage of information on trading transactions, dealer positions and prices. To the extent that TRs achieve comprehensive coverage of certain products, they can provide a timely overview of the build-up and distribution of exposures in the relevant markets. In this way, TRs support enhanced risk management of financial institutions and market infrastructures active in the field of OTC derivatives, facilitate the effective supervision and oversight of these entities, and support strengthened market discipline. They also enable central banks to establish early-warning mechanisms for emerging risks to financial stability and facilitate the work of market surveillance authorities to safeguard market integrity.

Given the importance of comprehensive data coverage, reporting of all trades to TRs should be mandatory. Furthermore, as in the case of CCPs, globally consistent measures are needed to ensure the safety and soundness of TRs, given the growing reliance of market participants, infrastructures and public authorities (such as central banks, securities regulators, market regulators and banking supervisors) on the accuracy and availability of these data. At the same time, it is critical to ensure the unfettered access of all stakeholders to the information stored in TRs, in line with their responsibilities and information needs. Possible global contract coverage of TRs could only be acceptable if the effectiveness of such information-sharing is ensured on a global basis; any possible remaining obstacles in this regard should be removed as a matter of urgency. An important further requirement for global trade repositories is the establishment of appropriate cooperative oversight arrangements⁷ in order to provide sufficient assurance to the concerned foreign central banks of issue, overseers and regulators regarding the well-functioning and resilience of the concerned TR and to enable them to address possible concerns in this regard.

3|2 Improved bilateral risk management

Careful attention also needs to be assigned to risk management requirements for OTC derivatives that will continue to be cleared bilaterally. While the Eurosystem shares the widely held view that OTC derivatives should be centrally cleared to the greatest extent possible, it has to be acknowledged that certain products are not suitable for central clearing, e.g. owing to insufficient product standardisation, market liquidity or availability of robust prices. In fact, from a financial stability perspective it may not even be desirable to submit 100% of clearing-eligible trades to central clearing. In particular, a CCP may assess that it is not in a position to manage the resulting risks appropriately, for example if it has not sufficient expertise in a certain product or it may not wish to accept the concerned counterparties to the transaction as participants because they do not comply with the CCPs' membership requirements. Furthermore, the introduction of a clearing obligation should not expose the CCP to a sudden and abrupt increase in volumes to clear that it cannot adequately handle with its existing capacities.

COLLATERALISATION AND CAPITAL CHARGES

Due to the more bespoke and opaque nature of non-CCP suitable trades, it is more difficult to determine, monitor and manage the corresponding risks and bilateral risk management must therefore be highly robust. Stringent risk controls for bilaterally cleared trades will also provide incentives for counterparties to use CCP services whenever available and feasible.

Against this background, bilaterally cleared trades should be subject to collateral requirements that are at least as sound as the risk controls typically applied by CCPs. While the use of collateral agreements – largely based on the ISDA Master Agreement and its Credit Support annex – increased during the past decade, it is still not comprehensive. According to industry estimates,⁸ 70% of all OTC transactions were

⁷ The main references are the principles for international cooperative oversight, set forth in Committee on Payment and Settlement Systems, *Central bank oversight of payment and settlement systems*, May 2005.

⁸ ISDA (2010).

subject to collateral agreements in 2009. One key objective will therefore be to further enhance the coverage of bilateral collateralisation. In addition, the effectiveness of the respective arrangements needs to be stepped up. The financial crisis highlighted for example deficiencies in the frequency of collateral (re-)valuation, the timeliness of margin settlements, and the stringency of the underlying risk assumptions (e.g. regarding the liquidity of collateral under stressed market conditions). Similarly, owing to different collateral management practices and divergent interpretations of the ISDA Master Agreement, disputes among counterparties are not uncommon, leading to uncertainty regarding the reliability of bilateral agreements. There are also operational challenges relating to limits in the automation and scalability of collateral management processes.

Appropriate capital charges for counterparty credit risk exposures are an important complement to adequate bilateral collateralisation. Given their higher inherent risk, bilaterally cleared OTC derivatives should generally be subject to higher capital requirements than centrally cleared transactions.

REPORTING

As centrally cleared trades, all bilaterally cleared trades should be reported to trade repositories to provide enhanced transparency on these exposures. In line with existing reporting requirements for securities, it would also seem useful to enhance post-trade reporting to regulators to facilitate an in-depth assessment of prudential supervisors and market surveillance authorities.

PORTFOLIO COMPRESSION, OPERATIONAL IMPROVEMENTS AND STANDARDISATION

Additional important measures to strengthen bilateral risk management relate to portfolio compression. Portfolio compression refers to the multilateral termination of economically redundant trades, while maintaining participants' net positions. In this way, it is possible to reduce the number of outstanding trades and the associated counterparty and operational risk as well as to limit the overall complexity of OTC derivatives portfolios for the benefits of both market

participants and public authorities. Furthermore, improvements of operational processes are needed to further expand the automated trading and post-trading of OTC derivatives to enhance the efficiency and safety of the respective processes and to address the possible risk of the emergence of processing backlogs and the resulting uncertainties as they emerged during the financial crisis.

A final important strand of work relates to initiatives to foster the standardisation of product and contract terms. Increased standardisation is not only a prerequisite for further progress in bilateral risk management through portfolio compression and more automated processing, but is also a key measure with a view to extending the population of potentially centrally clearable trades.

3|3 Cooperation between CCP regulators and overseers and banking supervisors

For three main reasons, regulators and overseers of CCPs for OTC derivatives should closely cooperate with prudential supervisors of the financial institutions – notably the large cross-border banks – that deal with these financial instruments.

First, the major OTC derivatives dealers are typically the largest participants of OTC derivatives CCPs. Adequate prudential requirements for the OTC derivatives business of banks are therefore essential not only to ensure the safety and soundness of the banks on a stand-alone basis, but also to rule out possible risks for the stability of the CCP. It should also be noted that such risks would most likely have implications for more than one CCP given that the major OTC derivatives dealers are typically members of several CCPs, owing to the limitations in inter-CCP interoperability.

Second, based on their status as general clearing members of OTC derivatives CCPs, banks may provide CCP-like services to smaller financial institutions which cannot or do not wish to access the CCP directly (e.g. because of the stringent nature of the CCP's membership requirements). Indeed, this is frequently the case in OTC derivatives markets given their high degree of market concentration and their correspondingly tiered nature. It is therefore

critical to ensure the functional equivalence of risk management requirements for centrally and bilaterally cleared transactions in order to pre-empt possible scope for regulatory arbitrage. For instance, if prudential rules for banks were less stringent than the rules for CCPs, there would be a risk that most of the clearing would be done by general clearing members rather than by CCPs, on the basis of lower risk management standards. More in general, functional equivalence is indispensable to foster the use of CCPs for the clearing of OTC derivatives and to reduce in this way also the direct exposures between major financial institutions.

Third, coordination and information-sharing between CCP regulators and overseers and banking supervisors is needed to ensure a comprehensive mitigation of systemic risk arising from OTC derivatives without possible regulatory gaps and loopholes as well as to appropriately reflect the specific risks arising from different clearing arrangements. As set out above, bilaterally cleared contracts are more likely to generate considerable frictions in OTC derivatives markets, namely in case of wider financial market turbulences. Indeed, such frictions could be larger than the share of the involved contract volumes may suggest and could also affect CCPs active in this field.

4| CURRENT INITIATIVES

In line with the respective G20 mandate to urgently strengthen the robustness of OTC derivatives markets⁹ several public sector initiatives are underway to foster the use of sound CCPs and TRs, to enhance bilateral risk management, and to step up cooperation between CCP regulators and overseers and central bank supervisors.

4|1 CPSS-IOSCO international standards

International standards, jointly formulated by central banking overseers and securities regulators,

provide a key reference point for efforts to ensure the soundness of OTC derivatives CCPs and TRs.

Many complex risk characteristics are unique for OTC derivatives products and were not fully discussed in the 2004 report of the existing Committee on Payment and Settlement Systems – International Organization of Securities Commissions (CPSS-IOSCO) Recommendations for CCPs (RCCP). Consequently, applying the RCCP to newly established OTC derivatives CCPs has involved a considerable degree of interpretation and judgment. Similarly, for TRs no international guidance currently exists at all, although these novel infrastructures are gaining an increasingly prominent role. The CPSS and IOSCO therefore recently published draft guidance on the application of the RCCP to CCPs clearing OTC derivatives as well as a set of factors that should be considered by trade repositories in designing and operating their services and by relevant authorities in regulating and overseeing them.¹⁰

Key issues highlighted in draft guidance for CCPs relate for example to the need for risk measurement and management tools and default management arrangements that are commensurate with the inherently more complex nature of OTC derivatives products and the more limited liquidity and transparency of OTC derivatives markets as well as for appropriate arrangements to ensure that decisions regarding the determination of the clearing eligibility of products is made on risk-based considerations only and may not be compromised by potential conflicts of interest at the CCP.

The CPSS-IOSCO report also proposes for the first time a set of objectives for ensuring resilience of trade repositories. In particular, the CPSS and IOSCO underline the importance of measures to ensure the operational reliability and resiliency of TRs as well as for the safeguarding and timely record keeping of data to ensure the continuous availability and accuracy of information stored in TRs. Other major concerns include the need for open access to the information and for well-founded legal frameworks and adequate regulatory and oversight arrangements for TRs.

⁹ The G20 leaders, at their September 2009 summit in Pittsburgh, concluded: "All standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements. We ask the FSB and its relevant members to assess regularly implementation and whether it is sufficient to improve transparency in the derivatives markets, mitigate systemic risk, and protect against market abuse."

¹⁰ See <http://www.bis.org/publ/cpss89.htm> and <http://www.bis.org/publ/cpss90.htm>.

The proposed guidance for OTC derivatives CCPs and trade repositories forms part of a more comprehensive review of the existing international standards for payment, clearing and settlement systems.¹¹ This review, launched by the CPSS and IOSCO in February 2010,¹² aims to update the standards in the light of the experiences since their adoption and some specific lessons relating to the functioning of market infrastructures during the financial market turmoil.¹³

The general review of the standards will address a number of issues that are highly relevant not only for OTC derivatives market infrastructures but for all critical market infrastructure. In principle, all financial market infrastructure (and not only CCPs and TRs) should be subject to the same requirements to the extent that they have to properly manage the same risks. For instance, the CPSS and IOSCO intend to propose a new standard for liquidity risk management. While this is an important issue for markets of comparatively less depth and liquidity, such as OTC derivatives markets, the financial crisis highlighted that liquidity resilience is key also for infrastructure serving "liquid" markets, partly because of potential spill-over effects from one market to the other and partly because unexpected behavior of critical players or lack of adequate infrastructure can create artificial liquidity problems. Similarly, the CPSS and IOSCO intend to strengthen the requirements for adapting risk management measures and regulatory and oversight arrangements to the cross-border nature and financial stability implications of financial market infrastructures.

4|2 European market infrastructure legislation (EMIL)

In line with the G20 mandate, and as other major jurisdictions, the European Union is currently in the process of developing legislation to (i) ensure that the vast majority of CCP-eligible OTC derivatives

contracts will be cleared via authorised CCPs; (ii) specify reporting obligations to trade repositories and as well as safeguards for access to relevant information held by trade repositories; and (iii) establish common regulatory requirements for these infrastructures. Concrete measures will be set forth in the European Market Infrastructure Legislation (EMIL)¹⁴ for which the European Commission intends to issue a draft proposal by mid 2010.

One of the main elements of EMIL will be to determine the appropriate scope for mandatory central clearing. It will be important to strike an appropriate balance between two main considerations in this regard. On the one hand, as mentioned above, any such requirements should not impact on the ability of CCPs to appropriately manage the corresponding risks. Any central clearing obligation should also be applied with a fair degree of reason and flexibility so as to avoid costs which are not justified by systemic risk mitigation. On the other hand, processes must be in place to ensure that CCP's decisions regarding the eligibility for clearing of products are grounded on risk-based considerations only and may not be compromised by potential conflicts of interest at the CCP, including for example through close scrutiny of the respective decisions by regulators and overseers and appropriate corporate governance arrangements.

There are strong indications that the progress towards the use central clearing for central clearing has been excessively slow so far and that regulatory requirements are needed to speed up the process. According to some industry estimates, only around 5% of outstanding OTC credit derivatives, 35% of interest rate derivatives and 15-20% of equity derivatives are currently centrally cleared, although a further 80-90% of OTC credit derivatives, 50% of interest rate derivatives and 55-60% of equity derivatives would be sufficiently standardised to allow for their central clearing. While it is clear that such estimates should be interpreted with some caution, given existing data limitations and considering also that

11 Three sets of standards are involved, namely the 2001 Core principles for systemically important payment systems, the 2001 Recommendations for securities settlement systems, and the 2004 Recommendations for central counterparties.

12 <http://www.bis.org/press/p100202.htm>.

13 For a European perspective on these lessons, see ECB (2010).

14 In addition, EMIL aims to promote progress towards a more integrated CCP interface for the single financial market through the adoption of common rules for CCPs for all financial instruments they deal with and through the removal of barriers preventing links between market infrastructures, subject to the appropriate management of risks arising from these arrangements. Up to now, there has been no legislation or binding regulation in place for financial market infrastructures at European level to address financial stability concerns. There are only initiatives and recommendations that are non-binding such as the ESCB-CESR recommendations for Securities Settlement Systems and CCPs as endorsed last year aimed at promoting the safety and soundness of clearing and settlement systems in the European Union. While all relevant authorities have expressed the intention to apply the recommendations in principle, there is no formalised institutional framework for their consistent implementation in practice. Regulatory arbitrage can still not be ruled out.

central clearing depends not only on sufficient product standardisation, there is clearly scope for improvement.

EMIL also aims to promote progress towards a more integrated CCP interface for the single financial market in the European Union through the first-time adoption of a common EU passport for CCPs for all financial instruments they deal with.¹⁵ Against this background, and in light of the Eurosystem's concerns regarding the implied risks of the use of offshore CCPs highlighted earlier, EMIL should also ensure the effective involvement of central banks of issue in the authorisation of CCPs that may wish expand their activities across the European Union.

4|3 Coordination between EMIL and the work of CPSS-IOSCO

The work on international standards for OTC derivatives CCPs and TRs and the development of EMIL are closely interrelated. The two initiatives address the same type of infrastructures and risks and should therefore be closely aligned to ensure the overall congruence of public authorities' approaches vis-à-vis the concerned infrastructures, particularly in view of the global nature of OTC derivatives markets. However, the two initiatives differ in terms of the legal enforcement and level of granularity of the respective requirements. The CPSS-IOSCO recommendations could provide a useful tool through which legislation is enforced in a globally consistent way across jurisdictions. Indeed, requirements with a higher level of granularity would require higher flexibility to quickly adapt or change them over time.

The CPSS-IOSCO standards should therefore serve as a reference point for legislators around the globe when defining requirements for OTC derivatives CCPs and TRs to ensure broad congruence of their frameworks. In particular, in view of the overlapping timetables for the finalisation of the revised international standards (scheduled for the first half of 2011) and the legislative reforms (with possible adoption in some major jurisdictions such as the United States already by the end of 2010) and considering also the rapidly

evolving nature and ongoing structural changes in OTC derivatives markets, national legislation should be also sufficiently flexible to allow for further global coordination in the specification of the main technical requirements during the implementation phase, which could again be supported by the CPSS and IOSCO. Against this background, the proposal in current US draft bills to explicitly allow the competent authorities (SEC and CFTC) to use the CPSS-IOSCO recommendations in implementing the forthcoming US OTC derivatives legislation would seem to go into the appropriate direction.

4|4 Cooperation between CCP regulators and overseers and banking supervisors

As set out above, regulators and overseers of CCPs should cooperate with banking supervisors to safeguard consistently high standards for the management of risks arising from OTC derivatives and to achieve a comprehensive overview and mitigation of systemic risk in OTC derivatives markets. To this avail, the competent standard-setting bodies – the CPSS, IOSCO and the Basel Committee on Banking Supervision (BCBS) – are engaged in a close dialogue to align their requirements. In parallel, competent central banks, regulators and banking supervisors are cooperating in the global OTC Derivatives Regulators' Forum to promote convergent approaches and information-sharing.

COOPERATION BETWEEN THE CPSS, IOSCO AND BASEL COMMITTEE

A first strand of work relates to the provisions in draft banking rules to apply a zero risk weight and capital charges for trades that are cleared through CCPs, provided that the CCPs comply with certain requirements. The CPSS, IOSCO and Basel Committee are discussing how to ensure consistency between the respective requirements imposed by banking supervisors and the approach and logic taken by the CPSS-IOSCO recommendations with regard to CCPs.

¹⁵ At present, only the non-binding ESCB-CESR recommendations for securities clearing and settlement systems are in place.

In this context, it is important to note that the CPSS-IOSCO's philosophy and actual approach allow for a nuanced assessment of CCPs by distinguishing between full compliance, broad compliance and partial compliance. An oversimplified translation of a CCP's compliance with any regulatory standards into capital requirements should therefore be avoided. Moreover, CPSS-IOSCO underlines that the safety of a CCP should not be assessed on the basis of individual risk controls, but of the right mix of all risk mitigation measures. Finally, when calculating the exposure of banks vis-à-vis CCPs, it is important to carefully consider the specific loss-sharing rules that the CCP has in place. In this context it may not be desirable from a financial stability perspective to consider margins more favourably than default fund arrangements. Indeed, the absence of default funds or other mutualisation instruments might result, in the event of a serious crisis, in a higher impact of adverse events and concentrated losses in a smaller number of participants, possibly reducing the ability of the CCP to act as a circuit-breaker for transmission of contagion.

A second strand of work relates to identifying appropriate and globally consistent measures to promote greater use of standardised OTC derivatives, implement mandatory central clearing as well as, where appropriate, exchange or electronic trading requirements. This assessment is conducted by a joint working group mandated by the Financial Stability Board. In addition to the CPSS, IOSCO, and the Basel Committee, the group also includes a number of national securities regulators, central

banks, and banking supervisors and the European Central Bank. The group is expected to conclude its work in the fourth quarter of 2010.

OTC DERIVATIVES REGULATORS' FORUM

Since January 2009, central banks, securities regulators, banking supervisors and market surveillance authorities have met periodically at global level to exchange views and share information on developments related to CCPs and TRs for OTC derivatives, initially focusing on CDS. Based on this work, in September 2009 the OTC Derivatives Regulators' Forum was formed to provide regulators with a means to regularly cooperate, exchange views and share information on CCPs and TRs for all OTC derivatives. The Forum has also worked to articulate the information needs of public authorities and market participants from OTC derivatives CCPs and TRs and to develop common reporting templates and formats in this regard. In addition, the Forum has assisted the establishment of cooperative oversight arrangements with regard to individual OTC derivatives infrastructures.

The Forum is a purely informal body without any binding decision-making capacity or authority for the regulation and oversight of individual infrastructures of its own. Instead, it derives its strength from each participant's independent and voluntary decision to participate in and support the work of the Forum and from promoting common awareness of issues and possible approaches to manage them.

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Under-collateralisation and rehypothecation in the OTC derivatives markets

MANMOHAN SINGH

Senior Economist

*Monetary and Capital Markets Department
International Monetary Fund*

At present there is sizable activity in the OTC derivatives market that is under-collateralised. The margin/collateral requirements at central counterparties (CCPs) should help the OTC derivatives market be better collateralised, lowering the derivatives risk at the large banks that dominate this market. However, the overall netting benefits may be less if the several CCPs that are in operation are not linked. Also, large banks make very effective use of collateral they receive that has rehypothecation rights.¹ This implies that overall cost to large banks in moving OTC derivatives to CCPs will be sizable.

NB The views expressed herein are those of the author and should not be attributed to the IMF, its Executive Board, or its management.

1 "Rehypothecation" has nothing to do with the French word "hypothèque" which means the right given to a lender to repossess the underlying asset in case of delinquency.

The recent financial crisis has provided an impetus to move the lightly regulated over-the-counter (OTC) derivative contracts to central counterparties (CCPs) rather than the bilateral clearing that has taken place to date. The debate about the future of financial regulation has heated up as regulators in both the United States and European Union seek legislative approval to mitigate systemic risk associated with large complex financial institutions (LCFIs). This paper shows that large banks active in the OTC derivatives market do not hold collateral against all the positions in their trading book and provides an estimate of this under-collateralisation. Whatever collateral is held by banks is allowed to be rehypothecated (i.e. the collateral received can be re-used for other purposes). Banks, in general, use collateral very efficiently. Since CCPs would require all positions to have collateral against them, off-loading a significant portion of OTC derivatives transactions to central counterparties would require large increases in posted collateral. These costs suggest that most large banks will be reluctant to offload their positions to CCPs.

We measure the exposure of the financial system to the failure of a large bank (or non-bank) dominant in the OTC derivatives market, according to their total "derivative payables" (and not "derivative receivables").² Derivative payables represent the sum of the counterparty's contracts that are liabilities of the large bank. Similarly, derivative receivables represent the sum of the counterparty's contracts that are the assets of the large bank. At present, the cost to the financial system from a large bank's derivative payables does not carry a regulatory capital charge and are not reflected in risk assessments.³ On the other hand, derivative receivables are imbedded in credit risk and there is already a capital charge/provision for potential non receivables. Regulators usually look at the asset side of the balance sheet for 'risk-weighted assets'. By using derivative payables as a yardstick, we thus provide an available measure of systemic risk that is comparable across all global banks that are active in the OTC derivatives market.

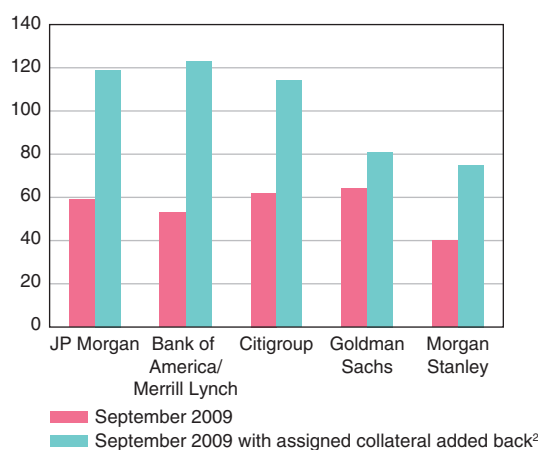
Financial information from recent years suggests that five US banks active in this market are carrying about USD 500 billion in OTC derivative payables exposure. The key institutions active in the OTC derivatives in the United States are Goldman Sachs, Citigroup,

JP Morgan, Bank of America, and Morgan Stanley. In Europe, Deutsche Bank, Barclays, UBS, Royal Bank of Scotland (RBS) and Credit Suisse are sizable players. In Europe, the five largest European banks had about USD 600-USD 700 billion in under-collateralised risk (measured by residual derivative payables) as of December 2008. It is useful to note that the International Swap and Derivatives Association's (ISDA) master agreements allow banks and others active in this market to net (or offset) their derivative receivables and payables exposure on an entity. Thus if Goldman Sachs has a positive position with Citigroup on a interest rate swap and a negative position with Citigroup on a credit derivative, ISDA allows for netting of the two positions. Thus, the focus of this article is on derivative payables, after netting.

Collateral is posted in an OTC derivatives context to cover for the likelihood of default, operational and counterparty risk of the transaction that is being collateralised etc. Residual derivative payables exposure can be used to show the maximal extent of under-collateralisation, which is substantial.

Chart 1
Derivative payables (after netting)¹

(USD billions)



¹ Assigned collateral is collateral posted against specific OTC derivative contracts that may be reused (rehypothecated) for other purposes by the institution to which it is posted.

² Residual derivative payables are the sum of the negative replacement values, after netting, associated with the institutions outstanding contracts. After-netting takes into account the impact of legally enforceable master netting agreements.

Source: IMF Staff and 10-Q filings

² In Europe and under the International Financial Reporting Standards, derivative payables are also called negative replacement values, and derivative receivables are called positive replacement values.

³ Unlike market risk, credit risk and operational risk that attract capital charges in the Basel II framework, systemic risk has not yet been considered by regulators. Also, regulators usually look at the asset side of the balance sheet for 'risk-weighted assets'; thus derivative payables, a liability, is a counterintuitive measure.

1 | COST TO MOVE OTC DERIVATIVES TO CENTRAL COUNTERPARTIES (CCPs)

According to earlier studies, uncollateralised derivative payables total about USD 2.0 trillion (Singh and Aitken, 2009; Segoviano and Singh, 2008). This largely stems from the present market practice where privileged clients of large banks do not post sufficient margin (e.g., sovereigns, central banks, AAA insurers, Fannie Freddie, and corporates etc.); also, banks do not post collateral with each other either. This figure is much higher than findings from a recent BIS study.⁴ This difference stems largely from the fact that "assigned collateral", which appears in the large banks' 10-Q⁵ (or similar) financial statements, is largely rehypothecated (or re-used) by the major players in this market for other purposes and is not dedicated/segregated for the purpose for which such collateral is received. A recent ECB study finds that the extent of collateralisation is only 44 percent, which could indicate that the ISDA survey may be on the high side.⁶ To the extent such 'assigned collateral' would now have to be posted at the CCP, this sum (often in the range of USD 20 – USD 70 billion per large bank) will now be unavailable to be re-used.

A key argument in favor of moving OTC derivatives to CCPs was netting across contracts, and the corresponding reduction in counterparty risk. The intuition is that the margin required to cover the exposure of the portfolio would be smaller under a CCP than margining its individual components, since the prices of the portfolio's components would be correlated and could be offset in a CCP. Current regulatory proposals envision that all standardised

(or eligible) derivatives should be cleared by CCPs. However, CCPs will require collateral to be posted from all its members. Thus offloading transactions to CCPs would make the under-collateralisation gap obvious and require large increases in collateral. The amount of capital needed to be raised will depend on how the collateral requirements are assessed by CCPs and the regulators (e.g., entity type, rating, or riskiness of the compressed portfolio that is offloaded to CCPs) and how firms choose to raise the required collateral.⁷

Dealers may, therefore, find it costly to move their trades to CCPs and these costs may not be trivial for the following three reasons: (i) the inability to effectively net internal position across products for any given client (ii) the larger upfront cost of posting initial margin and guarantee fund contributions at CCPs, and (iii) loss from the inability to rehypothecate the existing posted collateral which they use (and re-use) to finance other parts of their business.⁸

In this way, regulators could either mandate that largest players use CCPs, or make it costly for them to keep nonstandard contracts on the books. To achieve this, regulators are in favor of imposing some type of charge/tax on contracts that may not move to CCPs. While such a move may encourage standardisation, the overall collateral needs within the financial system may be onerous. The initial margin requirement (including monies toward the guarantee/default fund) to move to CCPs will increase. To attain a critical mass (which we assume to be two-thirds) of all standardised OTC derivatives to move to CCPs, some illustrative arithmetic based on margin requirement trends at the large CCPs suggests that about USD 200 billion may be needed in initial margins and guarantee funds (see Table 1).

4 BIS Quarterly, September 2009, paper uses the ISDA survey, and concludes that under-collateralization is about USD 1 trillion for both derivatives and receivables (which would imply roughly 0.5 trillion for derivative payables).

5 Form 10-Q shall be used for quarterly reports under Section 13 or 15(d) of the Securities Exchange Act of 1934.

6 EU Commission's comment on ISDA: "The dominant source of the nature and extent of bilateral collateral is ISDA's margin surveys. This section is based on the numbers provided by ISDA. However, the Commission services cannot judge the solidity of these numbers, as no information is available about the methodology for calculating the numbers. They should accordingly be considered as indicative only."

7 Many banks presently have sizable unencumbered or cash collateral deposited with their central banks. We assume, given the high ratings the banks active in the OTC derivatives market, that the opportunity cost of posting collateral to CCPs will be the same whether LCFIs use their deposits with central banks or opt for new funding in capital markets.

8 Initial margin in bilateral contracts for CDS contracts are typically high due to their 'jump risk' (or sudden change in the price of the reference entity) and can reach 10-30 percent of notional; for interest rate swaps (IRS) it is much lower, around 1 percent of notional or even less.

Table 1
Summary of costs to move to CCPs

(USD)

	Ratio of (initial margin + guarantee fund) to notional	Offloading 2/3 of present notional size of market	Extrapolated costs
Credit default swaps (CDSs)	1/600 to 1/300 ¹	2/3 x 36 trillion	40–80 billion
Interest rate swaps (IRSs)	1/5,000 to 1/3,300	Additional 100 trillion ²	40–50 billion
Forex, Equity, Commodities & Unallocated contracts	1/1,000	2/3 x 130 trillion	90 billion
Total Costs		2/3 x 600 trillion	170–220 billion

Note: In the absence of information on open-positions in the future, we use the present ratio of initial margin and guarantee fund to notional cleared, and estimate costs to LCFIs.

1 From a CCP view, clearing compressed portfolio(s) may shrink the USD 30 trillion notional to USD 3 trillion, but then they would use a ratio of 3/100 (or 3% for initial margin + guarantee fund/compressed notional cleared).

2 We acknowledge that about USD 200 trillion market in plain vanilla IRS is already being cleared. If the remaining USD 100 trillion of the more complex IRS clears, this would result in about 2/3 of the USD 437 trillion market in IRS moving to CCPs.

2 | REHYPOTHECATION (OR RE-USE) OF COLLATERAL BY LARGE BANKS

Any estimate of the costs of moving to CCPs is not complete unless there is discussion of how banks re-use the collateral pledged with them from various clients. Based on recent 10-Q reports, rehypothecation declined rapidly post-Lehman. After Lehman's bankruptcy, prime brokers have been demanding more cash collateral in place of securities (unless they are highly liquid securities). Post-Lehman, some investors have taken precautionary measures against rehypothecation by opting to hold assets in custody accounts. Data show that the decline between end-2007 through end-2009 for "total collateral received that can be repledged/ rehypothecated" by the largest seven US broker-dealers—Lehman Brothers, Bear Stearns, Morgan Stanley, Goldman Sachs, Merrill Lynch and JPMorgan—declined from about USD 4.5 trillion to USD 2.1 trillion (see Chart 2).

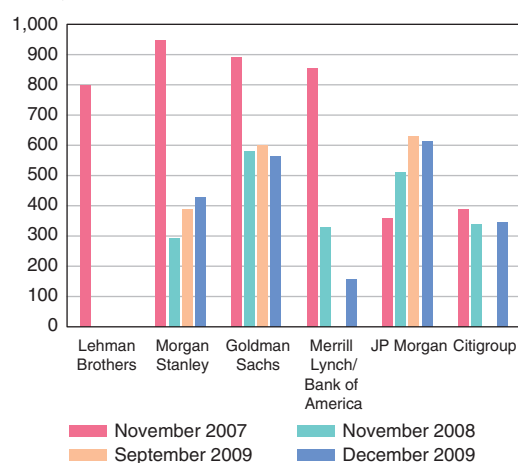
On-balance sheet data do not "churn", where churning means the extent of re-use of an asset. If an item is listed as an asset or liability at one bank, it cannot be listed as an asset or liability of another bank by definition; this is not true for pledged collateral. Since on-balance sheet is the snapshot of a firm's assets and liabilities on a given day, these cannot be the assets or liabilities of another firm on that day. However, off-balance sheet item(s) like 'collateral that is

permitted to be re-used' are shown simultaneously in footnotes by several entities. These firms do not own the collateral but due to rehypothecation rights they are legally allowed to use the collateral in their own name.

Since the US banks rehypothecate "collateral received that can be pledged" with European banks and vice versa, the source of off-balance sheet funding is higher (through the velocity of collateral).

Chart 2
Collateral received that can be pledged at large US banks
 (November 2007–December 2009)

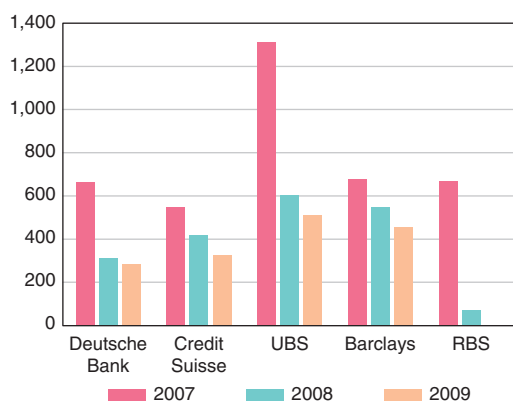
(USD billions)



Note: JPMorgan data post November 2007 includes Bear Stearns and Washington Mutual.

Chart 3
Rehypothecation declined during the recent crisis
for European banks
 (November 2007–December 2009)

(USD billions)



When we include other large banks with significant relations with the hedge fund industry such as Deutsche Bank, UBS, Barclays, RBS and Credit Suisse, the total available pledged collateral was over USD 10 trillion at end-2007 (see Annex 1)

The total assets under management (AUM) of the global hedge fund industry were about USD 2 trillion as of end-2007 (prior to the crisis). Assuming an average leverage of 2, the hedge fund industry held roughly USD 4 trillion of securities on a mark-to-market basis. Based on discussions with collateral teams at large banks (since hedge funds do not provide this information), about USD 1 trillion of the market value of securities of the hedge fund industry was rehypothecated, as of end-2007.⁹

Since hedge funds have typically contributed about 30 percent–40 percent of all pledgeable collateral received by the large banks, the churning of hedge fund collateral could have been between 3 and 4.¹⁰ Thus in the context of this article, if large banks were to post USD 200 billion with central counterparties in

the context of offloading OTC derivative positions to them, the real cost may be USD 200 billion times the relation to the churning factor (forthcoming Singh, 2010).

3| POLICY ISSUES FOR REGULATORS TO CONSIDER

The paper has noted that at present there is sizable activity in the OTC derivatives market that is under-collateralised. The margin/collateral requirements at central counterparties should help the OTC derivatives market be better collateralised, lowering the derivative payables at the large banks that dominate this market. However, the overall netting benefits may be less if the several CCPs that are in operation are not linked (i.e., there is no interoperability).¹¹ The margin requirements from multiple un-linked CCPs will be much higher than if only one existed or if they were linked. This implies that the full benefits of CCPs would not be forthcoming.

- Regulators should be cognisant that LCFIs active in OTC derivatives market under collateralise relative to the risk they assume (there is an estimated shortfall of up to USD 2 trillion if measured by the derivative payables carried by the major market participants).
- Whatever collateral already posted is currently allowed to be rehypothecated (so collateral needs will be even more onerous if placed at CCPs). Thus, offloading transactions to CCPs would make this gap obvious and require large increases in collateral.
- Large banks make very effective use of pledged collateral they receive that has rehypothecation rights; the churning factor of collateral gives an idea to the real cost of posting collateral.

⁹ Typically, hedge funds specialising in fixed-income and convertible arbitrage seek leverage and in lieu of the associated borrowing, post collateral with the large banks. Market sources indicate that on average, each of the largest 20-25 hedge funds borrowed USD 30-60 billion from their prime brokers (or roughly USD 1 trillion); collateral was posted by the hedge funds in line with their borrowing around end-2007. After Lehman's crisis, and given the regulatory efforts to reduce leverage, re-use of pledged collateral has now come down sizably.

¹⁰ In other words, 30 percent–40 percent x USD 10 trillion total pledged collateral divided by USD 1 trillion collateral that is allowed to be rehypothecated by the hedge fund industry. Note that our sample does not account for other large banks that may also be active in areas associated with pledged collateral (HSBC, Société générale, BNP Paribas, HSBC, Nomura etc.) and thus the churning factor may be higher since this would increase the numerator of this fraction.

¹¹ Interoperability (or linking of CCPs), which allows a market participant (e.g., LCFI) to concentrate its portfolio at a CCP of its choice, regardless of what CCP its trading counterparty chooses to use. Thus, at the level of each CCP, CCP_i may have access to collateral from another CCP, CCP_j that may go bankrupt in the future, so that losses involved in closing out CCP_j 's obligations to CCP_i can be covered.

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ANNEX

Current rules on rehypothecation in the United States and the United Kingdom

A defined set of customer protection rules for rehypothecated assets exists in the United States, but not in the United Kingdom. This difference meant that when Lehman Brothers International Europe (LBIE, United Kingdom) filed for insolvency there was little statutory protection available to those customers who allowed re-use of their collateral. In the United States, however, the Securities Investor Protection Act (SIPA) of 1970 provides for certain procedures that will apply in the event of the insolvency of a broker-dealer.

In the United Kingdom, an unlimited amount of the customer's assets can be rehypothecated and there are no customer protection rules. By contrast, in the United States, Rule 15c3-3 limits a broker-dealer from using its customer's securities to finance its proprietary activities. Under Reg T, the broker-dealer may use/rehypothecate an amount up to 140 percent of the customer's debit balance.¹ Created by SIPA, the Securities Investor Protection Corporation (SIPC) is an important part of the overall system of investor protection in the United States.² SIPC's focus is very specific: restoring funds to investors with assets in the hands of bankrupt and otherwise financially troubled brokerage firms (e.g., Lehman). Since 1970, SIPC has grossed more than USD 2 billion from its members' assessments that can be used by investors to recover assets in the event of a brokerage firm's insolvency.

A key reason why hedge funds have previously opted for funding in Europe (especially the United Kingdom) is that leverage is not capped as in the United States via the 140 percent rule under Rule 15c3-3. Leverage levels at many UK hedge funds, banks and financial affiliates have been higher, as the United Kingdom does not have a similar cap. Thus, prime brokers and banks would rehypothecate their client's assets along with their own proprietary assets as collateral for funding from the global financial system. Lehman's administrators PriceWaterhouseCoopers (PWC) confirmed in October 2008 that certain assets provided to LBIE were rehypothecated and no longer held for the client on a segregated basis and as a result the client may no longer have a proprietary interest in the assets. As such, LBIE investors (e.g., hedge funds) fell within the general body of unsecured creditors. Consequently, hedge fund assets with LBIE have remained frozen in the United Kingdom, whereas thanks to SIPA, this was not the case in the United States. Disentangling hedge fund assets from the broker-dealer/banks' proprietary assets that have been rehypothecated together, has been an onerous task in the United Kingdom..

Rehypothecation in Continental Europe

Our understanding from legal sources is that the EU law does not establish a quantitative cap on the rehypothecation of collateral pledged to broker-dealers akin to that found in the US's SEC Rule 15c3-3. EU law permits the parties to strike their own bargain as to how much (if any) collateral may be subject to rights of reuse. The regulatory regime for broker-dealers and their customers may lead to some re-thinking due to the litigation involving Dexia in 2009. However, changes are still distant from being finalised and it is impossible to say at this stage what changes (if any) can be expected as regards limiting rehypothecation rights.

¹ Assume a customer has USD 500 in pledged securities and a debit balance of USD 200, resulting in net equity of USD 300. The broker-dealer can rehypothecate up to USD 280 of the customer's assets (140 percent x USD 200).

² Derivatives, repos and futures are not covered by SIPA, so any collateral associated with those products may not be covered (so there is uncapped rehypothecation in the United States, if collateral is associated with these products). To clarify, SIPA's regime does not relate to collateral; rather it relates generally speaking to the return of a customer's equity as calculated through something called the net equity claim.

Silos and silences

Why so few people spotted the problems in complex credit and what that implies for the future

GILLIAN TETT
Financial Journalist
Financial Times

Why did so few people inside or outside the banking world spot the risks that were developing in the world of complex credit and credit derivatives before 2007? What does that failure imply for regulators and policy makers in the future? These questions have provoked a welter of debate since the banking crisis erupted – and a host of different answers.

Some observers have blamed the issue on flawed regulatory and economic thinking among policy makers and central bankers, or a “cover-up”, in the sense that bankers were deliberately hiding their riskiest behaviour from regulators. The issue of “regulatory capture” has also been blamed. However, this paper argues that two other problems need to be recognised too. Firstly, the financial world was a pattern of «social silence», to coin a phrase used by Pierre Bourdieu, the French sociologist, which ensured that the operations of complex credit were deemed too dull, irrelevant or technical to attract interest from outsiders, such as journalists or politicians. Secondly, there was a problem of silos, or fragmentation, both in a structural and cognitive sense, which made it hard for both insiders and outsiders alike to take a holistic vision of how credit was developing. Taken together, that made it hard to “join up the dots” about the dangers in the credit world, until it was too late. And, as such, this raises policy questions and challenges for the future.

Why did so few people inside or outside the banking world spot the risks that were developing in the world of complex credit and credit derivatives before 2007? What does that failure imply for regulators and policy makers in the future? These questions have provoked a welter of debate since the banking crisis erupted – and a host of different answers.

Some observers have blamed the issue on flawed regulatory and economic thinking among policy makers and central bankers, particularly those who displayed excessive faith in the self-healing, and self-regulating power of free markets. Others have argued that there was a "cover-up", in the sense that bankers were deliberately hiding their riskiest behaviour from regulators. The issue of "regulatory capture" has also been blamed, since the banking industry was so powerful and wealthy in recent years that its practitioners have been able to use their lobbying machine and political muscle in overt and covert ways to prevent policy makers (and others) from exercising too much oversight into, say, credit derivatives. That enabled the banks to reap fat profits for years – but prevented regulators from stopping the credit bubble, or so the argument goes.

All of these explanations have a grain of truth. However, from the perspective of someone who has both trained as a social anthropologist but now works as a financial journalist,¹ I would highlight two other issues, which are not usually featured in the financial debate. One of these is the problem of "silos", or the fact that many part of the financial world have been dangerously fragmented in recent years, both in a structural sense (i.e. how banks and regulators have been organised) and in a cognitive sense (i.e. how financiers and policy makers conceive of finance). That has made it very hard for anyone inside or outside the banking world to "join up the dots", and see how systemic risks were building across the system.

However, a second, related, problem is a pattern of social "silence". As Pierre Bourdieu, the French anthropologist and intellectual, observed in his seminal work *Outline of a theory of practice*,² the way that an

elite typically stays in power in almost any society is not simply by controlling the means of production (i.e. wealth), but by shaping the discourse (or the cognitive map that a society uses to describe the world around it.) And what matters most in relation to that map is not just what is discussed in public, but what is *not* discussed because those topics are considered boring, irrelevant, taboo or just unthinkable. Or as Bourdieu wrote: "The most successful ideological effects are those which have no need of words, but ask no more than a complicitous silence."

Most economists and policy makers who have looked at the world of high finance in recent years, have not paid much attention to these social issues such as the silo problem, or question of the cognitive map. That is no surprise: bankers, regulators and economists tend to be trained in academic disciplines such as science, mathematics or economics, and usually use those skills to analyse markets. However, Bourdieu's observations can help to shed some light on why the financial system spun out of control – and perhaps how to prevent that in the future. For not only was the whole arena of complex credit an area of social silence during the past decade – in the sense that it was rarely discussed in the wider public – but the dominant theories behind this activity was marked by "complicitous silence" too. And that, coupled with the silo issue, meant that very few observers *outside* the financial industry – and precious few inside it too – saw the risks in financial products such as credit derivatives; or not, that is, until it was far too late.

1 | THE FINANCIAL "ICEBERG"

To explain these two key points, it is worth recounting some of my own experience working as a journalist in the world of complex credit. This particular journey first started back in 2004, when I was working on the Lex column of the *Financial Times* – FT (the comment section) and asked to produce a memo outlining some of the areas that I thought that this Lex column should cover. The request prompted me to try a short, mental experiment: what would happen, I wondered, if a Martian (or anthropologist)

¹ Gillian Tett is currently the American managing editor of the *Financial Times*. She was previously the Capital Markets Editor, responsible for running global financial markets coverage. In that role she won a series of journalism awards for her coverage of the credit markets (British journalist of the year in 2009; Business Journalist of the year in 2008; Wincott award in 2007.) Before becoming a journalist she received a PhD from Cambridge University in Social Anthropology, based on fieldwork conducted in the former Soviet republic of Tajikistan. Her views expressed in this article are personal views; they do not represent the views of the FT.

² Bourdieu (P) (1972): « Esquisse d'une théorie de la pratique », Droz.

crashed into the banking world in London, New York or Paris, and drew a map of where the most intense areas of financial activity were occurring? Which parts of that map would look most "important"? And how would that pattern compare to how politicians and journalists discussed the financial world – or the "discourse" to use Bourdieu's term?

That mental exercise revealed a stark discrepancy. Back in 2004, there was extensive coverage in the mainstream financial and business media of how the equity markets behaved. There was also some discussion of the currency and commodity markets, and sporadic coverage of government bonds. However, there were almost no debate or coverage in the mainstream media about debt and derivatives, let alone issues such as credit derivatives, even though these areas were expanding very rapidly, and generating fat profits for the banks. Indeed, the discrepancy between the activity and coverage – or reality and discourse – was so stark, that my colleagues and I later observed in some internal FT memos that the financial system looked like an "iceberg". Part of this system (such as the equity world) was visible to all; but beneath that small, visible part lay a vast, shadowy, subterranean world of debt, derivatives, securitisation and credit that was barely discussed by journalists and politicians, let alone ordinary voters.

This pattern intrigued me. So, in early 2005 I moved to the so-called "capital markets team" at the FT, determined to peer into that subterranean part of the financial iceberg, where the debt and derivatives activity was underway. However, it was not an easy task. One practical problem that confronted my team was that the banking world as a whole was wary of letting mainstream journalists peer too deeply into the credit sphere. Most investment banks and hedge funds operated tight press policies, which curbed journalists' access to the bankers, and it was painfully hard to get even basic data about activity in many parts of the debt and derivatives world (most of this activity was over-the-counter in nature, and thus not reported to any third-party). By 2005 some bankers and credit rating agencies were starting to fill this "information gap". However, that data was patchy – and most banks had a vested interest in maintaining this opacity, to preserve their margins.

However, the "iceberg" pattern emphatically cannot be blamed just on the behaviour of the banks.

A second, equally important, issue was that most media outlets had little interest in exploring the subterranean financial shadows. That was primarily because the debt, derivatives and securitisation sectors did not make an obviously good "story", as it is usually defined according to the cultural traditions of the Western media. More specifically, when Western newspaper or television editors look for good stories, they typically assume that these need certain key ingredients, such as verifiable facts, tangible events, named, on-the-record quotes, and, above all, colourful individuals. The last point is particularly crucial: since time immemorial, humans have tended to communicate to each other by telling tales that are centred on people, be that classical myths, biblical parables, or (most recently) Hollywood epics. Consequently, Western journalists still typically assume that a "good story" is one with plenty of human element.

Back in 2005, many of these key ingredients were found in equity markets. Stories about share prices, after all, usually involved tangible events (i.e. companies did things), quotable facts (share prices moved) and colourful people (company executives or analysts gave quotes or had interesting personal stories.) But the debt and derivatives sectors lacked that: data was patchy, at best; there were few dramatic events, since the really important developments tended to occur in an elliptical, evolutionary manner. Moreover, these sectors appeared bizarrely devoid of humans; the individuals who worked in this world were usually determined to stay out of the spotlight and would rarely give on-the-record quotes. Stories about derivatives and debt thus tended to be hard to "sell" to an editor; or, more accurately, most editors did not think those stories would sell many newspapers, and were not that interested.

There was an additional problem too: extreme complexity. By 2004, the world of complex credit was swathed in jargon, and permeated with advanced mathematical techniques. That made it very difficult for journalists to penetrate this area, since few journalists have much training in advanced mathematics. In theory, of course, the media could have dealt with that by hiring some specialists, or using their resources to conduct extensive research. But by 2005 there was such disparity in the salaries of journalists and bankers that it was hard for newspapers to hire the "experts". In any case, since these topics did not fit the usual definition of

a "good story", most newspapers had little incentive to invest in this tale – particularly at a time when the media resources were dwindling. The net result, then, was that most journalists simply ignored the field. An analysis of the Factiva data base of global media, for example, which covers most English language publications in specialist and mainstream press shows that out of the 116m articles published between January 2000 and July 2007 (when the crisis in structured investment vehicles started), less than 200 articles of these mentioned the word "SIV" (structured investment vehicle). Moreover, those 200 odd articles were exclusively in specialist publications such as *Euroweek* and *Asset Securitisation Report*; the mainstream broadsheet publication in Europe and the United States did not cover the topic at all. There were more references to collateralised debt obligations (CDOs) in this period, running at 1710. However, once again, almost all of these references were in the specialist press; this was little coverage in the mainstream press, aside from the FT. Complex credit, in other words, was concealed from view from politicians and ordinary voters during this period. However, this was not simply due to a specific, banker "plot"; the more subtle problem was that the topic had been defined as utterly geeky and dull.

2 | SILOS

This lack of external oversight had important implications for how the world of credit in general – and credit derivatives in particular – developed. During the course of 2005 and 2006, my team at the FT scurried about the financial world, trying to paint a picture of how this unfamiliar territory operated. And as I conducted this research – often using skills that were similar to those I had used in a former career as an anthropologist – I was repeatedly struck by three specific points about this world. Firstly, it was clear to me that the bankers who were involved in developing credit derivatives and other complex products had a distinctive sense of their own identity, and separation from other areas of finance. That was partly because they spoke a jargon that was impenetrable to others (often including myself). It was also because they shared many educational

and career ties; since the field was small and young, most of those in this area had worked together, reinforcing the common bond.³

However, this group was also bound by two other key factors. Most of the bankers who were working in this field tended to treat money and credit as an a-cultural thing, ripped out of any social context. The roots of the word credit come from the latin *credere*, meaning "to believe", which is fundamentally a social construct. Yet, when bankers discussed CDOs in 2005 or 2006, they rarely mentioned that there were tangible human beings involved in this financial chain, or that human incentives might be shaping the way that finance worked. Instead, the credit derivatives bankers had developed their innovations assuming that finance was built on rational, a-human lines, like a silo that was semi-detached from the rest of society.

The other defining common point – in addition to the tendency to view credit as an a-cultural phenomenon – was the sense of a distinctive *mission*. By 2005, the credit sector was not simply booming, but this activity was wrapped up and presented within a distinctive and well-developed theory. There was, in a sense, a distinctive "credit derivatives creed"; or, more accurately, the bankers were driven by a well-defined sense of ideologies that they mostly (but not always) claimed to believe.

The centre piece of this ideology was something which might be dubbed the "risk dispersion creed." The starting point of this was the idea that a dramatic revolution had taken place in finance. Before the 1970's – or so this story went – Western banks had generally retained most of their credit risk on their own books. That left them exposed to dangerous concentrations of credit risks (as shown during the Savings and Loans (S&L) debacle in the 1980's); it also made it hard for banks to manage their regulatory capital in an efficient manner. However, in the aftermath of the S&L crisis, banks started to shed credit risk through loan sales and securitisation techniques. Then, when banks such as JPMorgan, Bankers Trust and Credit Suisse pioneered the use of credit derivatives in the mid to late 1990's, the process of risk dispersion intensified dramatically. And that essentially ushered in a Brave

³ See Karen Ho's book *Liquidated: An ethnography of Wall Street*, 2009, for an excellent discussion from an anthropologists perspective of how educational histories can create important quasi kinship ties among bankers on Wall Street. The work of Caitlin Zaloom, another American anthropologist, also sheds important light on the issue of identity among traders working in the Chicago electronic exchanges.

New Banking World, or so the bankers claimed, in which banks could shed credit exposures, or hedge against these, on a customised basis, and investors could acquire whatever risk profile they chose. Or as a JPMorgan banker noted in the late 1990's, in a comment that echoed the mood of the group: "Credit derivatives [will] fundamentally change the way that banks price, manage, transact, originate, distribute and account for risk."⁴

Unsurprisingly, most bankers took it for granted that this shift had been a very positive thing; as revolutionary as, say, the internet boom (and indeed, when bankers talked about the credit derivatives "revolution" they often echoed language from that internet sphere). However, their enthusiasm was not driven merely by the fact that innovation was producing fat banking profits; proponents of credit derivatives also insisted, sometimes with evangelical zeal, that innovation had also benefited the wider world, by creating a safer financial system. The credit derivatives group was unified an unquestioning assumption that the triumvirate of financial innovation, globalisation and free-market forces was a very positive thing; since credit derivatives appeared to represent "progress", they were assumed to be good.

In retrospect, of course, some of this creed looks laughably misguided. In theory, the idea of using credit derivatives to hedge credit risk, or to reduce concentrated loan exposures, certainly does have merits; moreover, many individual investors and institutions have used these tools in a beneficial way. However, by the early years of the 21st century, the practical operations of the credit derivatives markets were diverging starkly from the "creed." The idea of "free" markets is a case in point. When credit derivatives enthusiasts talked about their innovations in 2005 or 2006 to journalists like myself, they often claimed that one benefit of this innovation was that it would enable financial markets to become more "free". The more that assets (or risks) were traded between willing participants, the argument went, the more "liquid" those markets would be, and thus the easier it would be to determine the true price of assets or risk. A favourite buzzword for the bankers at JPMorgan (and elsewhere) who helped to develop

credit derivatives in the late 1990's, for example, was "market completion" – or the idea that the introduction of the derivatives technology into the financial system should enable markets to become more "complete", and presumably more perfect.

However, by 2005, "free market" ideals were often lacking in how the credit markets actually worked. Because so much of the market was relatively opaque, the free flow of information that would be needed to create a true market did not occur. Instead, powerful banks dominated information flows. More important still, as innovation became more intense particularly from 2004 onwards, products became so complex that they were increasingly difficult to trade. As a result, proper "market" prices did not really exist for items such as CDOs; instead, banks and hedge funds tended to use models to work out the value of these assets for accounting purposes. In some senses, that use of mark-to-model accounting made a mockery of the entire market completion ideal; however, few bankers spotted that contradiction – far less appeared to worry about it.

Similar terrible ironies revolved around the creed of risk dispersion. A central assumption driving innovation was that if investors and banks were given tools to hedge their risks, then free markets would disperse these risks in a rational, beneficial manner, thus enabling the overall financial system to better absorb shocks. And by 2006, bankers often pointed to the apparent resilience of the financial system between 2000 and 2006 as evidence that this theory worked. However, what bankers did not appear to recognise is that the very same techniques that were being used to promote risk dispersion were in *themselves* introducing new risks into the system. Most notably, as the process of risk dispersion became increasingly complex and opaque, it became exceedingly difficult for investors, regulators (and even bankers) to monitor credit quality or track where risk was moving in the system. It was also hard to see how investors were using credit derivatives. After all, when the sector had first evolved, it had been presented as a tool for hedging against risks; but by 2005 it seemed that this "hedging" function had been pushed aside, since many investors (and even banks) seemed to be using these tools to assume

⁴ Quote from *Blythe Masters*, a senior JPMorgan Bank (now at JPMorgan Chase) who was involved in the development of the credit derivatives market, in Tett (G.) (2010): *Fool's gold: the inside story of JPMorgan and how Wall Street greed corrupted its bold dream and created a financial catastrophe*, p. 56. This book essentially relates how a small team of JPMorgan bankers developed credit derivatives from the mid 1990's onwards.

more risk. (By 2006, for example, banks were creating growing quantities of synthetic mortgage-backed CDOs, primarily for the purpose of letting investors place bets on the outlook for the US housing market – rather than enabling banks to hedge existing cash loans.) That changed the nature of the market in a fairly fundamental way, since a tool that was theoretically supposed to reduce risks in the system as a whole was fuelling more risk-taking. However, this was not well understood – or debated.

This begs the crucial question: why? After all, it was not just the bankers who were enmeshed in this credit dispersion creed; many Western policy makers, particularly in the Anglo-Saxon world, were too. In its 2006 report, for example, the International Monetary Fund declared – echoing the views of many policy makers – that “the dispersion of credit risk by banks to a diverse and broad set of investors... has helped make the banking and financial system more resilient.”⁵ To be sure, there were a few maverick voices which dared to express public scepticism. At the Bank for International Settlements, for example, Claudio Borio and William White of the economics department questioned the innovation creed. Other independent consultants, such as Janet Tavakoli, Satyajit Das or Arturo Cifuentes, did so too.⁶ However, such public mavericks were rare; mostly, group-think predominated.

Why? Part of the problem can be blamed on the issue of greed; or, more accurately, incentives. By 2005 and 2006, the bankers, lawyers and rating agency officials who were active in the credit derivatives world were often reaping fat bonuses, making big profits from the business of complex credit. Few of those had any incentive to rock the boat. And for the most part, those “insiders” were the only people who really knew how the new game of complex credit operated – precisely because the outsiders did not seem particularly interested in finding out how the submerged part of the financial iceberg actually worked.

But another, more subtle problem was the presence of numerous silos *within* the financial world too. As I moved around the banking system as a journalist in 2005 and 2006, I was often struck that most investment banks appeared to be run in an oddly segregated, quasi-tribal manner. On paper,

the banks were supposed to work as coordinated units; in practice, though, different departments often seemed to operate more like warring tribes, since each department or desk was competing for resources against other departments, and power and information generally only flowed vertically upwards, in a hierarchical way. Unsurprisingly, the department was earning most money for the bank typically wielded the most power, enabling it to grab more resources, and – most crucially – rebuff attempts by other departments to exercise restraint or oversight. Thus, while the risk departments at the large banks were supposed to exercise control, their efforts to rein in risk-taking often failed, because the risk-management department was very weak relative to the powerful CDO desk. The classic example of this was UBS: there very few people outside the UBS CDO desks actually knew what those desks were doing, let alone how this activity changed the total risk exposure of the bank. And while the top management were theoretically supposed to watch risk-taking, the fragmented nature of the UBS bureaucracy meant that even the top management were often in the dark. Or as Peter Kurer, a member of the UBS board told the Financial Times, shortly after so-called “super-senior” CDOs had caused massive losses for the bank: “Frankly most of us had not even heard the word “super-senior” before the summer of 2007... we were just told by our risk people that these instruments were triple A, like Treasury bonds. People did not ask too many questions.”⁷ However, UBS was not at all unique; these patterns were found at most banks, particularly those (such as Merrill Lynch or Citi) which subsequently suffered big losses.

Information flows were also fragmented across the market as a whole. By 2005 complex credit was evolving so rapidly, and the banks were in such fierce competition with each other, that they kept much of their activity in the CDO or Credit default swap (CDS) world relatively secret from each other. That made it hard for outsiders to track how the market was developing; if my FT team, for example, wanted to get an estimate for the size of total trading activity in, say, index CDS trades in 2006 or the price of single name CDS contracts, we had to ring around the brokers to get their individual “guesses”. However, this opacity also made it hard for the bankers *themselves* to assess overall market risk. For while individual CDO or

5 IMF: *Global Financial Stability report of April 2006*.

6 For a more extensive debate about which groups did – or did not – question the innovation creed, see *Fool's gold*, pp. 151-160.

7 The UBS shareholder report on its writedowns, published in April 18 2008, provides extensive data on this saga, illustrating the fragmented nature of information flows inside UBS and correspondingly poor risk controls.

CDS desks could see their *own* trades; they could not see how these fitted with other deals being conducted by other banks. Nor could they tell whether these trades were creating new market-wide correlations or concentrations of risk (as, say, happened with all the super-senior CDO deals that were struck between the banks and AIG insurance Group.)

Of course, in theory, there were people in the system who were supposed to be taking that broader, system-wide view: namely the supervisors and central banking community. However, these bodies were also hampered by a lack of good market data. The public sector also suffered from a "silo" problem of its own. Over in the United States, for example, the regulatory structure was divided into numerous institutions, which sometimes appeared to compete with each other, rather than cooperate. In Europe regulatory responsibilities were split across borders, between different national regulators. And even in regions that tried to create more unified regulatory structures, there was often a problem of mental fragmentation. By the early years of the 21st century, for example, the United Kingdom had consolidated its supervisory functions into one body, the Financial Services Authority (FSA), which was charged with creating a more unified system of regulation. However, because the FSA was run separately from the Bank of England, officials tended to assume that monetary policy could be discussed and implemented separately from financial oversight. Thus, when the economists at the Bank of England discussed monetary conditions from a macro-economic perspective in 2005 or 2006, they rarely made any attempt to link this to topics such as the booming issuance of CDOs; similarly, when supervisors at the FSA examined individual banks, they did not usually attempt to draw wider systemic conclusions. Mental bifurcation dominated, in a very unhelpful way.⁸

The net result of these silo problems, on numerous levels, was that very few people or institutions were in any position to "join up the dots", to see how the financial world was spinning out of control, let alone stop this. To be sure, by 2006 some individual bankers were feeling very uneasy about what was going on (and often wrote anonymous emails about this to my team). Some senior central bankers and regulators were getting nervous too, primarily because they

could sense that a credit bubble was forming – albeit in ways that they did not fully understand. However, the *scale* of this credit bubble, and the dangerously high level of risk-taking and risk concentration was not clear to most insiders – let alone those journalists, politicians or voters, who barely knew that CDOs, CDSs and so on existed at all.

3 | LESSONS FOR THE FUTURE

These days, the costs of this pattern are crystal clear. As the credit bubble has collapsed, banks have been hit with a tsunami of bad loans, creating massive losses for banks and investors alike. It would be quite wrong to blame those disaster entirely on financial innovation. Excessive liquidity, poor regulatory structures, loose monetary policy and an old-fashioned credit cycle played a role too. However, the fact that leverage got so out of control, for so long, was partly a function of complexity and opacity, if nothing else because this allowed bankers to take risks that few others understood.

Thankfully, those dramatic events now appear to be sparking some change in behaviour. On both sides of the Atlantic, a drive is now underway to overhaul the rules and regulations that shape the banking world. Bank capital adequacy standards are being tightened; derivative activity is being pushed towards central clearing houses and electronic exchanges; the sale of derivatives to unsophisticated investors is being controlled; rating agencies face more surveillance; meanwhile there is also a drive to force far greater transparency on the derivatives sector. There are also signs that many institutions are trying to combat the "silo" problem – although it is rarely described in quite those terms. Most large investment banks, for example, currently face considerable pressure to show their shareholders and regulators that they are improving their risk management techniques. As they divert more resources to this task – belatedly – most are also now trying to use holistic forms of risk management than before. Tunnel vision is discouraged; instead, the senior managers are being urged to delve more deeply into the individual silos – or departments – of their bank, to see how risks are building across the

⁸ Paul Tucker, then head of markets at the Bank of England, was one of the few who tried to bridge this gap; in 2006, for example, he discussed the potential link between CDO issuance and SIV activity, and M4 money supply data in a speech. However, this was notable primarily because this type of debate was so rare at the time.

bank as a whole, in relation to the wider market place. The public sector is also embracing more holistic modes of thought. In the Western central banking community there is now shift towards the use of so-called macro-prudential regulatory techniques, which emphasise a more "joined-up" approach to financial and monetary policy. The type of mental bifurcation that used to occur in the United Kingdom, between monetary and financial policy, is diminishing. Western governments also claim to be promoting more regulatory coordination too. In Europe there is now a drive to create pan-European banking oversight, and bodies such as the Financial Stability Board are trying to promote better coordination across the industrialised world too.

Last but not least, the sense of separation between finance and the rest of society is also crumbling – to a degree. Since the crisis exploded, journalists and politicians have started to peer more actively into parts of the financial iceberg. In countries such as the United States and United Kingdom, parliamentary committees have quizzed bankers. There has been a flurry of media article about topics such as credit derivatives, CDOs or structured investment vehicles. No longer is it blithely assumed that specialist areas of finance can be merely left to the specialists; belatedly, the "outsiders" looking in.

Meanwhile, on both sides of the Atlantic, politicians and regulators have demanded more transparency in finance, to enable "outsiders" to monitor what is going on. If a journalist now wishes to get basic data about price levels in the CDS world or overall trading flows, say, these are generally available from bodies such as Markit (a private data company) or Bloomberg. In America, the Depository Trust and Clearing Corporation (DTCC) is now collecting data on trading flows via a warehouse, and the macro figures are posted on the web. This does not provide a perfect market snapshot: the data is posted with a timelag and it is not very "user friendly" for non-experts (such as journalists). However, it does provide some guide to what is occurring, and is a contrast to the situation a few years ago, when journalists had absolutely no way of tracking market flows.

Furthermore, in Europe another very valuable source of information has emerged from the central bank

community. In August 2009 the European Central Bank (ECB) published a very comprehensive review of the credit derivatives markets, which offered the most detailed snapshot of activity seen before. That was followed in October 2009 with a review from the Banque de France, which also analysed in detail some of the net exposures, risks and concentrations.⁹ These two studies revealed some fascinating patterns, such as: the high level of concentration in trading flows among small group of dealers and the fact that dealers were not only trading heavily with each other, but also insuring each others' risk. As such, it raised significant questions about whether the credit derivatives market was living up to its stated goal of providing risk transfer: instead of moving risk *outside* the banking system, the data from these two studies suggested that a "pass the parcel" pattern had developed to some degree, where risk was being shuffled around the banking world, and possibly reconcentrated in unexpected places. That raises worrying questions about the potential knock-on impact of a bank failure. Meanwhile, another fascinating finding from the ECB study was that European banks are, on balance, net sellers of credit protection against European governments; this also raises questions about the structure of the market, since by 2009 many of these European banks were being supported by implicit and explicit government guarantees.

Whether the publication of this type of market analysis prompts politicians and regulators to reshape the market in a radical sense remains to be seen; if nothing else, publication of this data has helped to support calls to move this activity onto robust clearing houses. But perhaps the crucial point is this: if this type of broader market analysis had been available to regulators, journalists, politicians – and even bankers – five years ago, it is possible that some of the worst excesses in the system might have been spotted at an earlier stage. The type of correlated exposures that developed around AIG insurance Group, to name but one example, might have been visible at an earlier stage.

That does not mean, of course, that the battle against silo thought is over; on the contrary, there is a big risk that the same type of patterns that created the last crisis will resurface again soon. It is still unclear, for example, whether banks will

⁹ See "Credit default swaps and financial stability: risks and regulatory issues", in the Financial Stability Review, Banque de France, September 2009; also "Credit default swaps and counterparty risk", European Central Bank, August 2009.

continue to devote more resources to their risk management departments, or to promote forms of holistic oversight, if – or when – the current sense of crisis and regulatory scrutiny recedes. Another is whether regulators and central bankers can truly promote a more joined-up vision of supervision. In public, financial officials (and bankers) insist that they wish to promote global coordination; however, in practice national politicians are increasingly acting in unilateral ways. In the early months of 2010, for example, American politicians threatened to force banks to spin off their derivatives operations, while European politicians did not; conversely, German politicians imposed a unilateral ban on the use of sovereign credit derivatives for speculative trading, as opposed to hedging (or "naked shorting"). At best, such ad hoc unilateral moves create uneven financial regulation; at worst, they threaten to shatter investor confidence and undermine coordinated oversight.

It is also unclear how long non-bankers will continue to watch the financial world. In 2008 and 2009, amid the sub-prime market meltdown, there was extensive public debate about issues such as mortgage-backed bonds. In 2010, as sovereign debt problems intensified, there was also more discussion about once-ignored topics such as sovereign CDSs. But while awareness of credit derivative issues, say, might have risen there are still numerous important areas of finance, such as algorithmic trading in the equity markets, the operations of the repo market, or even the pension industry, which are largely ignored. The problem of the financial iceberg thus has not disappeared. On the contrary, as the mainstream media faces growing commercial pressures – and thus fewer resources –

there is likely to be a growing temptation for many journalists to keep ignoring "difficult" or geeky topics; just as credit derivatives used to seem.

This problem is not unique to finance. On the contrary, similar patterns can be found in numerous other areas of the modern world, ranging from science to medicine to energy and manufacturing. For as innovation speeds up in the 21st century, specialists are engaged in highly complex activities in numerous silos, that almost nobody outside that particular silo understands, or even knows about – even though the activity in that silo often has the ability to affect society as a whole. There is thus a bizarre paradox in the 21st century world: namely while the global system is becoming more interconnected in some senses, the level of mental and structural fragmentation remains very intense.

There are no easy answers to this. However, if nothing else, the story of complex credit over the past decade shows that to "fix" finance it is not enough to simply devise better rules; policy makers, bureaucrats, bankers and journalists alike must redouble their efforts to "join up the dots", to develop a holistic vision of how systems work – and, above all, combat the silo curse. After all, if there had been more "outsiders" peering into the credit derivatives world at an earlier stage, amid greater transparency, the worst abuses of these seemingly-sensible innovations would probably never have occurred. Sunlight, as the old adage goes, can be a good disinfectant, or guard against corruption; however, transparency and public oversight can *also* be a powerful way to introduce some basic common sense. In that sense, then, the story of credit derivatives is a powerful parable for our times; it is to be hoped that the key lessons are not forgotten too soon.

Mitigating systemic risk in OTC derivative markets

NOUT WELLINK

Chairman

Basel Committee on Banking Supervision

President

De Nederlandsche Bank

The financial crisis has demonstrated that turmoil in OTC derivative markets can exacerbate financial distress. One of the challenges policymakers currently face, is to mitigate the risks these markets pose to the financial system. Inducing a shift towards more central clearing is an important step in the right direction as it tempers counterparty risk and increases transparency. However, this will only be part of the solution as risk management systems of Central Counterparties (CCPs) are not necessarily equipped to clear all types of derivative contracts. In addition, central clearing concentrates risk and may actually increase systemic risk. By implication, it is crucial that CCPs have robust risk management systems in place. Furthermore, enhancing the safety and transparency of bilateral clearing also merits attention as a certain share of OTC derivative trades will remain bilaterally cleared. Given the international character of OTC derivative markets, coordination between national supervisors and regulators is crucial for any initiative to succeed.

Over the past decades we have witnessed the advent of over-the-counter (OTC) derivative markets. According to the latest BIS estimates,¹ the notional value of outstanding OTC contracts exceeded the staggering amount of 600 trillion USD. Although derivatives have contributed to financial innovation and market efficiency, the past years have also demonstrated that these markets are capable of exacerbating financial distress. Not surprisingly, this is nowadays a topic of heated debates among policy makers, market participants and academics worldwide. Consensus exists that OTC markets have to become safer, more resilient, and more transparent. Rightfully, a crucial role is envisaged for Central Counterparties (CCPs) in accomplishing this. However, notwithstanding the fact that CCPs can indisputably contribute to reducing systemic risk, they imply a potential concentration risk as well. These risks can become systemic if a CCP is large enough. Therefore, we should make sure that these risks are adequately mitigated. Furthermore, although inducing a shift towards more CCP clearing is a step in the right direction, it is merely a partial solution for systemic risk in OTC derivative markets, as there will always remain a bilaterally cleared market. By implication, enhancing the safety and transparency of the latter merits as much attention. The key levers policy makers can pull are capital requirements and transparency which, given the international interconnectedness of derivative trading, should be harmonised in a worldwide common regulatory framework.

1 | CENTRAL COUNTERPARTIES AS PART OF THE SOLUTION

Turmoil in OTC derivative markets can adversely influence financial stability in at least two ways. Firstly, a default of a large dealer might spread significant losses to other (systemic) financial institutions. Secondly, fear for a failure of a large dealer – whether justified or not – might cause a flight out of its derivatives portfolio, thereby increasing the likelihood of an actual failure. With respect to both issues, the opaque nature of OTC derivative

markets is an important contributor to financial distress. Against this background, policymakers worldwide – among which the Dutch Central Bank – have called for an increased standardisation of OTC derivative contracts to induce a shift towards more central clearing. There are several ways in which more CCP clearing can mitigate risk in the financial system.

A CCP REDUCES COUNTERPARTY CREDIT RISK

A CCP takes over the counterparty risk management of its clearing members. In the CCP model, a clearing member has to deal with only one highly credible counterparty instead of with many counterparties with different risk profiles. On the other hand, market participants in a bilaterally cleared market have to assess every counterparty individually. Furthermore, in case of a default, the unwinding of positions is likely to become a lingering process accompanied by an extended period of uncertainty. Also, the parties involved will have to look out for their own interests, thereby most likely incurring significant legal and administrative costs.

As a central counterparty to a number of market participants, a CCP has the possibility to net on a multilateral instead of a bilateral basis. Multilateral netting is efficient as it has the potential to reduce the total exposures in the system more than bilateral netting does. Nevertheless, a precondition for these efficiency gains to be realised is that the number of market participants opting for central clearing is large compared to the number of those continuing to net bilaterally (see for example Duffie and Zhu).² Especially with respect to credit default swap (CDS) contracts, a CCP might not always be able to mitigate counterparty risk fully, as these markets are typically characterised by relatively few dealers holding relatively large positions, often of limited liquidity. Furthermore, risk management becomes more challenging for CCPs when only certain asset classes (for example credit CDSs or interest rate swaps – IRS) are centrally cleared, as this reduces netting opportunities.

...ENFORCES COLLATERAL REQUIREMENTS...

In a bilaterally cleared market, derivative traders may be confronted with commercial pressures to

¹ http://www.bis.org/publ/otc_hy0911.htm

² Duffie (D.) and Zhu (H.) (2010): "Does a Central Clearing Counterparty Reduce Counterparty Risk?", Graduate School of Business Stanford University, March.

refrain from requiring initial margins. According to ISDA,³ 23% of bilateral trades are not collateralised, and for the remaining 77% it is unclear to what extent positions are covered by collateral. A CCP enhances safety in derivative markets by not only requiring variation margin, but also initial margin and clearing fund contributions. Initial margin is provided by clearing members to the CCP to cover potential future credit exposures. Indeed, clearing members provide resources to be used in case of their own default. This is attractive from an economic perspective as 'the polluter pays'. The second line of defence in case of default of a clearing member is the CCP's clearing fund; a CCP requires clearing fund contributions from its participants to cover any losses and liquidity pressures resulting from a default of one of them. As such, uncollateralised losses are shared among clearing members. Furthermore, CPSS-IOSCO⁴ has recommended that risk management systems of a CCP should be designed in such a way that a default of its largest clearing member can be withstood (at any moment).

Nevertheless, market participants in a bilaterally cleared market are also able to mutualise loss sharing, for example by using insurance in the form of a third-party guarantee. In this way, the cost of these guarantees are spread across the client base. Conceptually, this kind of insurance also centralises risk assessment and risk mitigation. Unfortunately, this is not common practice in bilaterally cleared markets.

Finally, an important risk reducing feature of a CCP is that it calculates new collateral requirements at least on a daily basis, and monitors whether the collateral is actually deposited. In a bilaterally cleared market this is not necessarily the case. In fact, while in bilaterally cleared markets currently 23% of the risk is not covered by collateral, for centrally cleared products the uncovered risk is 0% because of initial and variations margin requirements and clearing fund contributions. In short, in a centrally cleared world, counterparty risk can be more convincingly mitigated than in a bilaterally cleared world.

...AND INCREASES TRANSPARENCY

Pre and post trade transparency enhance market efficiency and reduce market risk. This is especially valuable in OTC markets, which are opaque by nature. CCPs can improve transparency of OTC prices and offer insight into which counterparties have systemically relevant positions. CCPs can disclose this information on a day-to-day basis. This kind of information is highly valuable to macroprudential supervisors. It has to be noted though that whether a CCP actually discloses this data depends on the reporting practices of the CCP in question. Strict reporting requirements therefore need to be enforced.

Trade repositories (a relatively recent phenomenon which functions as a data warehouse for OTC contracts) have been proposed as an alternative. Unfortunately they currently only provide information on nominal values, and do not disclose this information on a day-to-day basis. Therefore, up till now CCPs are capable of realising a higher degree of transparency.

In sum, a CCP can contribute to financial stability and standardisation of OTC derivative contracts through mitigating counterparty risk, multilateral netting, requiring initial margins and clearing fund contributions, and enhancing transparency.

2 | CENTRAL CLEARING – A STEP IN THE RIGHT DIRECTION BUT NOT THE HOLY GRAIL

Although a shift towards more central clearing should be advocated based on the arguments outlined above, CCPs are no panacea for all products and all markets. A CCP is typically attractive for a market with highly liquid, standardised contracts. After all, counterparty credit risk is lower for liquid products than for illiquid products, as the former

³ ISDA: *International swaps and derivatives Association*.

⁴ CPSS-IOSCO (2004): *"Recommendations for Central Counterparties"*, November.

can be relatively easily liquidated after a credit event. Adequately covering these risks might result in margin requirements which render central clearing overly expensive for market participants (although it seems questionable whether products are economically viable in case they prove to be too expensive to be centrally cleared). Therefore, a CCP should only clear those contracts with substantial trading volumes. Another condition for CCP clearing is that the credit quality of participants is relatively uniform. Should the available margins and clearing fund assets be insufficient to cover the losses in case of a default, not only the polluter but also the survivors end up paying the bill.

CONCENTRATION RISKS SHOULD BE MITIGATED AS MUCH AS POSSIBLE

Notwithstanding the fact that a CCP takes over and mitigates counterparty risk by multilateral netting, it eliminates only part of it. In fact, counterparty risk is concentrated at the level of the CCP. In case of a large CCP, this concentration risk can become systemic. The direct effect of a CCP failure would then be that its counterparties, possibly systemic financial institutions, are confronted with significant losses. The indirect effect might be even more worrying: a loss of confidence in central clearing in general, causing a flight out of CCPs. Needless to say, it is crucial that risk management systems of CCPs are robust, especially given the complex risk characteristics of OTC derivatives. In this context, a key concern is to prevent regulatory arbitrage as competition between CCPs on risk management standards might significantly impair the stability of the system. Therefore, the importance of an internationally consistent approach is obvious (the work of the OTC Regulators Forum and the CPSS-IOSCO recommendations for OTC derivative clearing are valuable means to this end).

In addition, all CCPs should have access to at least a certain minimum of central bank facilities. If a CCP finds itself confronted with a temporary liquidity shortage, access to intraday central bank liquidity lines could take the sting out of the tail, thereby reducing the likelihood of unnecessary financial distress.

3 | ENHANCING THE SAFETY AND TRANSPARENCY OF OTC BILATERALLY CLEARED DERIVATIVES TRADES

Although a significant share of derivative contracts will be cleared centrally going forward (partially as a result of regulatory reforms) this will not be the case for all contracts. Obviously, there will always remain derivative contracts which are simply not eligible for central clearing. On top of this, market participants in some cases may have incentives to prefer bilateral clearing to central clearing, as the safety provided by CCPs comes at a cost: initial margin requirements and mandatory clearing fund contributions. These costs might be perceived as a significant burden, especially in times when liquidity is scarce. Arguably, even if national authorities would decide upon making central clearing of CCP eligible contracts mandatory, enforcement might prove to be difficult. After all, the assessment of whether a derivative contract is not standardised because of the specific purpose it serves, or merely to circumvent the obligation to clear, is highly complex. Although it might seem that simply banning products that are not CCP eligible would resolve this issue, this solution has significant drawbacks. The fact that OTC derivatives fulfil a non-negligible role in the financial system should not be ignored. Besides offering hedging possibilities to both financial and non-financial institutions which may not always be obtained through standardised contracts, these products have the potential to foster financial innovation. When a new product is created, trading volumes can be expected to be thin initially. If it turns out that this product truly implies a valuable addition to the incumbent set of products, it most likely will become more liquid and eventually standardisable.

Assuming that a certain share of contracts will always remain cleared bilaterally, enhancing the safety of OTC derivative markets is highly important besides stimulating central clearing and creating a sound regulatory oversight framework for CCPs.

The key issue regarding bilaterally cleared markets is that not only counterparty risk has to be taken into account in risk management practices, but also the additional risk that is posed to the financial system. This additional risk can be seen as a negative externality, comparable to pollution. If left fully to the market, the outcome in terms of collateralisation will be below the social optimum. Although policymakers should be cautious not to unduly intervene in markets, the existence of (negative) externalities is a valid ground for some degree of intervention.

STRENGTHENING CAPITAL REQUIREMENTS FOR BILATERALLY CLEARED TRADES

In order to stimulate a shift towards central clearing Basel II attaches a zero capital weight to derivative positions cleared by a CCP. Currently, the Basel Committee for Banking Supervision is proposing enhancements to the capital requirements for counterparty credit risk exposures arising from (among others) derivative trading.⁵ The basic idea is straightforward: the capital weight for derivatives that are bilaterally cleared will be higher than those for derivatives cleared through CCPs. In this way, the additional risk the former poses to the system can – at least to some extent – be taken into account. One important additional benefit of the proposals is that by increasing the cost of bilateral clearing, they provide an incentive to clear derivative positions centrally. Currently, the benefits of a CCP do not always outweigh the costs, which might change with the introduction of relatively high capital

requirements for non-cleared derivatives. However, capital requirements for OTC trades should not be excessively penal (as also mentioned by the FSA and HM Treasury in their joint paper).⁶ They should rather reflect the excess risk that is posed to the system. Measures that go beyond this are likely to unduly impair market efficiency. For these measures to be successful it is a condition sine qua non that they are implemented in an internationally consistent manner and in a timely fashion.

INCREASING TRANSPARENCY

One of the key factors contributing to systemic risk resulting from OTC derivative markets is a lack of transparency. As mentioned earlier, the increase use of trade repositories have been proposed to reduce the opaque nature of these markets. Although trade repositories are already operational for some products,⁷ the scope, quality and accessibility of these institutions should be further improved.⁸ Currently, trade repositories disclose merely a bare minimum of information. In order to truly address the opaqueness of OTC markets, trade repositories should disclose their information – including both pre- and post-trade data – to the relevant supervisors at least. Whether these data should also be made public is still subject to heated debate, since this will potentially impair proprietary trading strategies. As is often the case, policymakers face the challenge of striking a balance between making markets safer on the one hand and not unduly hampering market efficiency and innovation on the other.

Policy proposals to induce a shift towards more central clearing should be advocated. A CCP offers multiple advantages compared to bilateral clearing. However, increased use of CCPs creates potential concentration risks as well, which may become systemic if a CCP is large enough. Therefore it is crucial that CCPs comply to (inter)national recommendations and guidelines for risk management standards. Clearly, CCPs should only clear those contracts for which they can adequately manage the risks. This implies that there will always remain a bilaterally cleared market, as non-standard illiquid contracts do not fall within this category. In short, inducing a shift towards more central clearing is a step in the right direction, but not enough to fully mitigate systemic risk in OTC derivative markets. By implication, enhancing the safety of bilaterally cleared derivatives should remain high on the international policy agenda. A combination of higher capital requirements for transactions that are not cleared through a CCP and enhancing transparency through the increased use of trade repositories will help achieve this. It needs to be stressed that for all measures to be successful, an internationally consistent approach is crucial.

⁵ Basel Committee on Banking Supervision (2009): "Strengthening the resilience of the banking sector", December.

⁶ FSA & HM Treasury (2009): "Reforming OTC derivative markets, a UK perspective", December.

⁷ As of 2006 DTCC acts as a trade repository for the trade in credit derivatives, and since January 2010 TriOptima is the trade repository for interest rate derivatives.

⁸ Trade repositories for other derivatives still have to be established.

What risks and challenges do credit default swaps pose to the stability of financial markets?

ORICE WILLIAMS BROWN

Director

*Financial Markets and Community Investment
US Government Accountability Office*

Credit default swaps (CDSs) pose a number of risks to institutions and markets, many of which are not unique. These risks include counterparty credit, operational, concentration, and jump-to-default risks. CDSs also pose other risks and challenges. For example, CDS markets generally lacked transparency, which may have compounded market uncertainty about participants' overall risk exposures, the concentration of exposures, and the market value of contracts during the recent crisis. Further, regulators note that the potential existed for market participants to manipulate certain CDS prices to profit in other markets that CDS prices might influence, such as the equity market, and that the lack of transparency could contribute to this risk. Others also raised concerns about the use of CDSs for speculative purposes, including concerns about uncovered or "naked" CDS positions – the use of CDSs for speculative purposes when a party to a CDS contract does not own the underlying reference entity or obligation. While regulators and market participants note that over-the-counter (OTC) derivatives, to varying degrees, pose some similar risks, particularly equity derivatives, the US regulatory structure for CDSs does not provide any one regulator with authority over all participants in the CDS market, thereby making monitoring and managing potential systemic risk difficult.

NB: This article was based on testimony before the Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises, "Systemic risk: regulatory oversight and recent initiatives to address risk posed by credit default swaps" (GAO-09-397T). Individuals making key contributions to this testimony include Karen Tremba, Assistant Director; Kevin Averyt, Nadine Garrick, Akiko Ohnuma, Paul Thompson, and Robert Pollard.

Credit default swaps (CDSs) offered the most recent example of the challenges of regulating financial markets in the 21st century. Like many other over-the-counter (OTC) derivatives, CDSs pose a variety of risks and challenges to financial institutions and the stability of the financial system. In the months leading up to the most recent crisis, CDSs became a major focus when CDS spreads widened in the days leading up to the bankruptcy of Bear Stearns as more CDS buyers sought credit protection, concerns were raised around the settlement of CDS contracts on Lehman Brothers following its bankruptcy, and the likelihood of a bankruptcy increased at American International Group, Inc. (AIG) as a result of losses generated by the company's sale of CDSs. The unfolding crisis led many to question the opacity of the CDS markets and how best to manage their risks. While the recent crisis has prompted reconsideration of the current regulatory structure to better enable it to address systemic issues that may arise, it has also prompted regulators to push for and several major banks to commit to clear OTC derivative trades, including CDSs, through a clearinghouse.

1 | CDS POSE FOUR MAIN RISKS TO FINANCIAL INSTITUTIONS AND MARKETS

The main risks to financial institutions and markets from credit default swaps include counterparty credit risk, operational risk, concentration risk, and jump-to-default risk. However, the degree of risk associated with CDS varied depending on (1) the type of CDS, (2) the reference entity for the CDS, and (3) how the CDS was used. In simple terms, counterparty credit risk is the risk to each party in an OTC derivatives contract that the other party will not fulfill the obligations of the contract. Banks and other financial institutions that have large derivatives exposures use a variety of techniques to limit, forecast, and manage their counterparty risk, including margin and collateral posting requirements. In particular to CDS, besides potentially not receiving contractual payments, a purchaser of CDS whose counterparty fails would suddenly be left without protection and could either

have to replace the CDS contract at current, higher market values or go without protection.

Regulators, market participants, and observers identified several challenges in managing CDS counterparty credit risk. First, although margin and collateral posting serve as a primary means of mitigating the risk of loss if a counterparty does not perform on its contractual obligations, calculating margin and collateral amounts can be difficult because of the challenges associated with determining the actual amount of counterparty exposure and the value of the reference asset. Specifically, agreeing on the valuation of CDS contracts on asset-backed securities (ABS) and collateralised debt obligations (CDOs) may be difficult for market participants. Second, margining practices are not standardised and vary depending on the counterparty. For example, market participants and observers suggested that institutions with high credit ratings, for which exposures were considered to pose little credit risk, were not initially required to post collateral. These firms included bond insurers and AIG Financial Products, a noninsurance subsidiary of AIG. However, when some of these institutions' ratings were downgraded, the institutions had difficulty meeting collateral calls. Third, the CDS market lacks comprehensive requirements for managing counterparty credit risk. Finally, bilateral collateral and margin requirements for OTC derivatives do not take into account the counterparty credit risk that each trade imposes on the rest of the system, allowing systemically important exposures to build up without sufficient capital to mitigate associated risks.

The second type of risk is operational risk. This is the risk that losses could occur from human errors or failures of systems or controls. With CDSs, there are several operational steps that are required to process trades, such as trade confirmation, which were not automated until recently and thus created backlogs in the system. In a report issued in 2007, Government Accountability Office (GAO) reported that these backlogs were largely due to a decentralised paper-based system and the assignment of trades to new parties without notifying the original dealer – a process known as novation. For instance, in September 2005, some 63 percent of trade confirmations (or 97,650) of the 14 largest credit derivatives dealers had

been outstanding for more than 30 days. These large backlogs of unconfirmed trades increased dealers' operational risk, because having unconfirmed trades could allow errors to go undetected that might subsequently lead to losses and other problems. Potential problems also existed in the operational infrastructure surrounding physical settlement, novation, and valuation of CDS.

The third type of risk, concentration risk, refers to the potential for loss when a financial institution establishes a large net exposure in similar types of CDS. For example, AIG presented concentration risk because it sold a significant amount of CDS protection on related reference entities without also holding offsetting positions and did not sufficiently manage this risk. This risk tends to be greater for dealers that sell CDS protection because no margin and collateral requirements exist to help ensure that the selling firm will be able to meet its potential obligations. Also, the potential exposures are greater and more uncertain than the fixed premium payments of a purchaser of CDS protection. Additionally, if a market participant decides to hold a large concentrated position, it could experience significant losses if a credit event occurred for one or more reference entities. But concentration risk can create problems for market participants even without a credit event involving the reference entity. For example, a market participant may face obligations to post collateral on a large net exposure of CDSs if its financial condition changes, potentially resulting in financial distress for the dealer. AIG is a well-known example of this problem. When its credit rating was downgraded, the contracts required that it post collateral, contributing to the company's liquidity crisis.

Market participants suggested that the degree of risk from concentrated net exposures was tied to the nature of the reference entity or obligation. For example, a concentrated position in CDSs on mortgage-related CDOs may present more risk than CDSs on a highly-rated corporation or US government bonds. Further, concentration risks at one firm may also present challenges to other market participants and the financial system. According to a regulator and an observer, the lack of clear information on the net CDS exposures of market participants makes informed decisions about risk management difficult, a situation that becomes increasingly problematic

when a credit event occurs. A regulator also testified that because the CDS market was interconnected, the default of one major participant increased the market and operational risks faced by more distant financial market participants and impacted their financial health. The near-collapse of AIG illustrates the risk from large exposures to CDSs.

Finally, jump-to-default risk, as it relates to the CDS market, is the risk that the sudden onset of a credit event for the reference entity can create an abrupt change in a firm's CDS exposure. Such a credit event can result in large swings in the value of the CDS and the need to post large and increasing amounts of collateral and ultimately fund the settlement payment on the contract. The default of a reference entity could put capital strain on the CDS seller from increased collateral and payment obligations to settle the contract. For example, because CDSs generally are not funded at initiation, a CDS seller may not have provided sufficient collateral to cover the settlement obligations.

2 | CDSs CAN ALSO POSE A NUMBER OF OTHER RISKS AND CHALLENGES, INCLUDING LACK OF TRANSPARENCY, POTENTIAL FOR MANIPULATION, AND SPECULATION

Other risks and challenges from CDS include a lack of transparency in the CDS market, the potential for manipulation related to the use of CDS as a price discovery mechanism, and the use of CDS for speculative purposes. According to some regulators, market participants, and observers, limited transparency or disclosure of CDS market activity may have resulted in the overestimation of risk in the market. Such a lack of transparency may have compounded market uncertainty about participants' overall risk exposures, the concentration of exposures, and the market value of contracts. For example, some have noted that uncertainty around how bankruptcy of Lehman Brothers would affect market participants contributed to a deterioration

of market confidence. More specifically, according to some reports, up to USD 400 billion of CDSs could have been affected, but the Depository Trust and Clearing Corporation (DTCC) later stated that its trade registry contained USD 72 billion of CDS on Lehman Brothers, and this amount was reduced to about USD 21 billion in payments after bilateral netting. The actual number was reported to be even lower. Some market participants suggested that concerns about transparency were even more prevalent with customised CDS products because the contracts were not standardised and their prices were determined using estimates rather than prices from actual transactions.

Some suggested the potential existed for market participants to manipulate prices to profit in other markets that CDS prices might influence, such as the equity market, and that the lack of transparency could contribute to this risk. CDS price information is used by some market participants as an indicator of the market's perception about a company's financial health. Market participants use spreads on CDS contracts to gauge the financial health and creditworthiness of a firm. However, two regulators and an industry observer suggested that whether CDS prices accurately reflected creditworthiness was unclear because the market was largely unregulated and the quality of data is questionable in an opaque market. According to testimony by a Securities and Exchange Commission (SEC) official in late 2008, the lack of transparency in the CDS market also created the potential for fraud, in part because the reporting and disclosure of trade information to SEC was limited. More specifically, the official testified that a few CDS trades in a relatively low-volume or thin market could increase the price of the CDS, suggesting that an entity's debt was viewed by the market as weak. Because market participants may use CDS as one of the factors in valuing equities, this type of pricing could adversely impact a reference entity's share price. One market observer we spoke with offered the following hypothetical example: if the CDS price moves up and the equity price moves down, an investor could profit from holding a short position in the equity by buying protection in the CDS market. The SEC official testified that a mandatory system

of record keeping and reporting of all CDS trades to SEC should be used to guard against the threat of misinformation and fraud by making it easier to investigate these types of allegations. However, another regulator suggested that the price discovery role was not a unique role to CDS and that exchange-traded derivatives such as foreign exchange and interest rate derivatives also served a price discovery function.

Another challenge identified by regulators and market participants was the frequent use of CDS for speculative purposes, an issue that has raised some concerns among some regulators and industry observers. Some have suggested that the practice should be banned or in some way restricted. However, other regulators and market participants disagree and note that speculators in the CDS market provide liquidity to the market and facilitate hedging. Many of the concerns stem from uncovered or "naked" CDS positions or the use of CDS for speculative purposes when a party to a CDS contract does not own the underlying reference entity or obligation. Because uncovered CDS can be used to profit from price changes, some observers view their function as speculation rather than risk transfer or risk reduction. For example, one regulatory official stated that these transactions might create risks, because speculative users of CDS have different incentives than other market participants. In addition, one regulator stated that when participants used CDS for speculative purposes, there was no direct transfer or swap of risk. Instead, the transaction creates risk from which the participant aims to profit. Market participants also noted that the risks associated with CDS did not stem from their use for speculation but from a failure to manage the risks, particularly CDS of ABS (asset backed securities). Market participants and an observer also explained that a restriction on uncovered CDS would create a market bias in favor of protection buyers, because it is easier for them to hold a covered position. This bias could impact the liquidity of the market, because trading would be confined to those with an exposure to the referenced entity. Finally, market participants noted that firms used CDS to manage risks from many economic exposures in addition to risks such as counterparty credit exposures that arise from holding the underlying reference obligation.

3 | CDSs OVERSIGHT HIGHLIGHTS THE CHALLENGES OF AN OUTDATED REGULATORY SYSTEM

The current regulatory structure for CDSs and other OTC derivatives does not provide any one regulator with the authority over all market participants, making potential systemic risk hard to monitor and manage. In the United States, federal oversight of CDS trading is largely conducted through the banking regulators' safety and soundness oversight of the supervised banks that act as dealers in the market. Unlike equities or futures markets that are regulated by SEC and the Commodity Futures Trading Commission (CFTC) respectively, CDSs are not regulated broadly as financial products because SEC and CFTC lack authority to do so. Federal financial regulators, namely the banking regulators, generally monitor activity in the CDS market through information obtained from their supervised entities, but comprehensive and consistent data on the overall market have not been readily available.

Regulators have sought to address potential systemic threats arising from CDS activities mainly through collaborative efforts with other US and foreign supervisors and key market participants. However, the extent to which regulators routinely monitored the CDS activity of unregulated market participants is unclear. While US federal financial regulators do not have authority over CDS as a product, in the United Kingdom, the Financial Services Authority (FSA) has authority over most CDS products and can collect information on those products. Despite this broader authority, FSA has pursued most of its regulatory efforts in collaboration with US regulators.

Financial regulators and the industry have initiated several efforts to begin addressing some of the most important risks posed by CDS and similar products, particularly operational and counterparty credit risks. These efforts include improving the operational infrastructure of CDS markets, implementing a clearinghouse or central counterparty to clear CDS trades, and

establishing a central trade registry for CDSs. If implemented effectively and sustained, the recent initiatives could begin to address some of the risks related to the use of CDS. However, their effectiveness will likely be constrained by two factors. First, participation in a clearinghouse and central trade registry is generally voluntary. And second, the efforts would not include the more customised and highly structured CDSs that can include CDSs on complex reference entities that may pose significant risks to institutions and financial markets. A number of other reforms to the CDS market have surfaced but face challenges. These include mandatory clearing or restricting CDS trades. Finally, OTC derivatives that share some of the risks related to CDSs could benefit from similar efforts to mitigate their impact.

Financial regulators and market participants have recently taken steps to try to address risks posed by CDSs. The efforts have focused on three main areas: (1) operational and infrastructure improvements, (2) creation of a central trade repository, and (3) development of clearinghouses to clear CDS contracts. In September 2009, 15 major banks committed to clear most of their OTC trades through a clearinghouse.

The issues involving CDSs have illustrated the current system of regulation lacks broad authority to monitor, oversee, and reduce risks to the financial system that are posed by entities and products that are not fully regulated, such as unregulated subsidiaries of regulated institutions, and other non-bank financial institutions. The absence of such authority may be a limitation in identifying, monitoring, and managing potential risks related to concentrated CDS exposures taken by any market participant. The inability of the regulators to monitor activities across the market and take appropriate action to mitigate them has contributed to the current crisis and the regulators' inability to effectively address its fallout. Going forward, any regulator tasked with a systemwide focus would need broad authority to gather and disclose appropriate information, collaborate with other regulators on rule making, and take corrective action as necessary in the interest of overall financial market stability, regardless of the type of financial product or market participant.

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OTC derivatives market structure and the credit profiles of wholesale investment banks

ALEXANDER YAVORSKY

Vice President – Senior Analyst, Financial Institutions Group

Moody's Investors Service

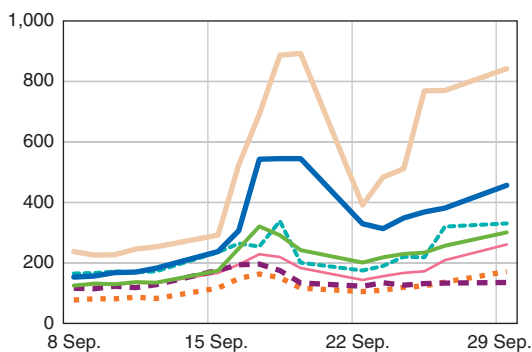
The OTC market is at a critical crossroads from a number of angles – proposed regulatory changes, changing end-user expectations, competitive pressures from the listed market, and the effect of all these on the banks' economics from the business. The possible paths forward may include central clearing, exchange trading, stricter capital, margin and disclosure requirements, for all or parts of the USD 600T market. Moreover, as part of this process, we are seeing the creation of new, or growth of existing, systemically-important institutions – central counterparties. Each of these paths, and the way in which they will interact, have different implications for systemic and individual firm risks.

1 | SUMMARY OPINION

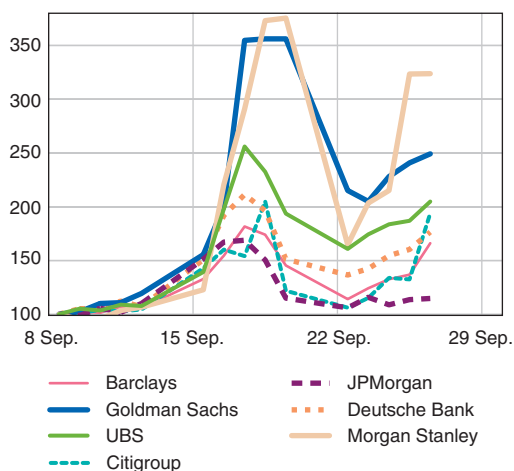
The global financial crisis exposed vulnerabilities in the business models of wholesale investment banks (WIBs). These include risk management weaknesses, high leverage, confidence-sensitivity, excessive concentrations, opacity, and a high degree of interconnectedness. The extent of these vulnerabilities differs from firm to firm, but, at their core, they are a by-product of the WIBs' business

Charts 1 and 2 CDS spreads of selected WIBs

(5-year CDS 2008, in bps)



(5-year CDS 2008, % change)



Source: Markit

¹ The 14 largest dealers that are part of the so-called "G14" Group.

model and the structure of the markets in which they operate.

At the apex of the crisis in the fall of 2008, the market appeared to shift away from credit differentiation as credit default swap (CDS) spreads on major WIBs spiked (charts 1 and 2). Fearing that the largest WIBs were inextricably connected, investors, counterparties, and customers rushed to reduce their exposures to the sector first and ask questions later. As a result, even the best capitalised firms came under great stress and required extraordinary external support to survive.

The severity of the inflection point was, of course, compounded due to the market's previous tolerance of the WIBs' high leverage, growing reliance on short-term funding, and, in many cases, ill-understood and therefore liberal use of customer collateral to fund their own operations.

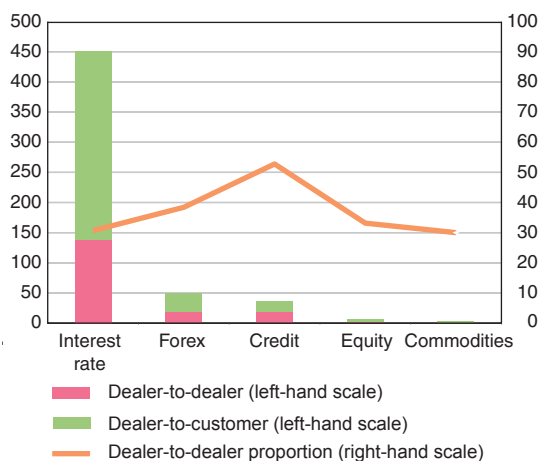
The key factors contributing to the perception of interconnectedness were the same ones that served as the transmission mechanism for the market's violent and unremitting response to it: overreliance upon short-term funding provided by the previously indiscriminating repo market, warehousing of risky assets whose valuations collapsed as leverage became more expensive and bids and liquidity disappeared, and the propensity to engage in crowded trades, made worse by leverage.

But arguably no factor was and remains more singularly associated with the interconnectedness of WIBs than their active presence in the over-the-counter (OTC) derivatives market. Measured at USD 600 trillion in notional amounts and dominated by fourteen global dealer-WIBs,¹ it is one of the largest and most concentrated financial markets in the world (chart 3).

Currently unregulated and largely bi-lateral in nature, the OTC derivatives market itself is now at a critical inflection point. It is among the key subjects of financial market reform initiatives in Europe and the United States. As of this writing, lawmakers and regulators are coalescing around a market structure based on central clearing, possibly exchange-based trading, higher capital and margin requirements,

Chart 3
OTC derivatives market

(notional amount in USD trillions, December 31, 2009) (%)



Sources: BIS, Moody's estimates

and more meaningful transparency standards. The expectations of end users of OTC derivatives are also changing as greater awareness of the market's risks is leading some to scrutinise their relationships with dealers and explore such alternatives as the listed futures market. Finally, the dealers themselves have recognised² the need for some structural reforms as being prudent and tactically necessary given the potential for very restrictive regulations.

The future OTC derivatives market structure and practices will have an impact on both systemic risk and the credit profiles of its major participants. For this reason, analysing the above-mentioned developments and their credit implications has been and will remain one of our key analytical and research priorities.

This article summarises our views on the credit benefits and risks of possible future market structures. We do so by first covering the key shortcomings of the status-quo structure laid bare by recent events – the default of Lehman Brothers and the (near) collapse of Bear Stearns and AIG. We then discuss how central clearing, exchange-trading, and the imposition of higher margin and capital requirements may address these shortcomings. Such a discussion, of course, would be incomplete without acknowledging the new risks or, at the very least, analytical considerations, that would be introduced by these approaches.

² G14 dealers have outlined their specific commitments in a letter to the Federal Reserve released on March 1, 2010.

2| THE STATUS-QUO MARKET STRUCTURE AND PRACTICES

In analysing the "credit delta" of any new market mechanisms, it helps to first understand where the current system worked properly and where it did not. Importantly, in thinking about "market structure and practices," one has to go deeper than the market's bi-lateral (as opposed to centrally-cleared) structure or, for example, the specific terms of the standard ISDA (International Swaps and Derivatives Association) Master Agreement template. The market's structure, practices and behavior of its participants also reflect the accounting and regulatory capital treatment of OTC derivatives, the degree of public transparency about market exposures and concentrations, the perceived ratio of risks and revenue rewards from market-making activities, and the existence (or lack thereof) of clear and well-tested close-out procedures for a large counterparty.

With the above in mind, we offer our perspective on the key credit positives and negatives of the current market structure and practices of the OTC derivatives market. We then discuss several of these in greater detail.

CREDIT-NEGATIVES:

- contributed to both the reality and perception of interconnectedness among WIBs;
- reduced the market's ability for credit differentiation to a binary view on whether a firm's derivatives book was sufficiently "too complex to unwind" so that it would warrant emergency government support;
- facilitated undercapitalised, reckless "carry trades";
- in some cases, replaced risk management and hedging with "net-and-forget" self-deception;
- Lehman's OTC derivative counterparties incurred large trade replacement costs;
- flawed customer fund segregation practices exposed Lehman's counterparties to unexpected losses;
- compounded liquidity problems for Bear Stearns.

CREDIT-POSITIVES:

- OTC derivatives market-making has been a major net earnings contributor for WIBs;
- enhanced hedging ability when properly used;
- intra-dealer netting and collateralisation practices have generally worked well;
- industry initiatives around redundant trade compression, electronic confirmations, and Depository Trust and Clearing Corporation's (DTCC) Trade Information Warehouse have improved the market's operational integrity;
- CDS auction process has been battle-tested and appears to work well.

As discussed above, the WIBs active participation in the OTC derivatives market is a key reason for their interconnectedness. What does this mean? An interconnected market is not the same thing as an integrated market (or markets) in which capital flows seamlessly and valuations quickly reflect the totality of available market data. Highly-integrated markets can leave investors feeling shell-shocked as they did on May 6, 2010 when the US cash equity and futures markets fell in fearsome and self-reinforcing unison; still, they are generally accepted to be a good thing because they improve price discovery, liquidity, and efficiency.

An interconnected market, in contrast, is defined by the condition whereby the disorderly failure of a large market participant can have negative, and potentially, catastrophic consequences for many of the others. This definition applies to the OTC derivatives markets where major dealers are interconnected through tens of thousands of bi-lateral OTC contracts, without the credit intermediation and just-in-time liquidity³ offered by a central counterparty (CCP). As a result, when a dealer fails, its surviving counterparties are faced with potential unsecured derivative receivables and the need to replace "orphaned" contracts in a volatile market.

Indeed, this is precisely what took place when Lehman Brothers defaulted in September 2008.

Box 1**"Credit default swaps: market, systemic, and individual firm risks in perspective"**

"In the event of a default by a major CDS counterparty, there would likely be considerable systemic damage that would extend beyond credit default swaps."

"Since CDS protection sold by the defaulting counterparty would no longer be in place, the protection buyers would have to either replace such protection in the open market or bear the risk of not having such protection any longer. The pricing "shock" caused by the general widening of credit spreads following the failure of a major dealer, and the sudden increase in demand for CDS protection, could apply to both the CDS and the cash markets, and could lead to substantial losses for affected counterparties. In addition, the actual process of winding down the CDS book of the failed dealer and the collective attempts by its counterparties to replace the now-defunct CDS trades would put the CDS market under unprecedented operational strain."

Source: Moody's, May 2008.

As we discussed in our May 2008 research report on the CDS market (see box), most other major dealers suffered losses in the hundreds of millions of dollars each⁴ as their derivatives books became unbalanced due to the disappearance of OTC contracts with Lehman. In extremely volatile market conditions (chart 4) – themselves largely the direct consequence of Lehman's default – dealers suffered significant contract replacement costs and, until the necessary trades were replaced, hedge ineffectiveness. In other words, market participants lost their OTC contracts precisely when they needed them most and when replacing them became most expensive.

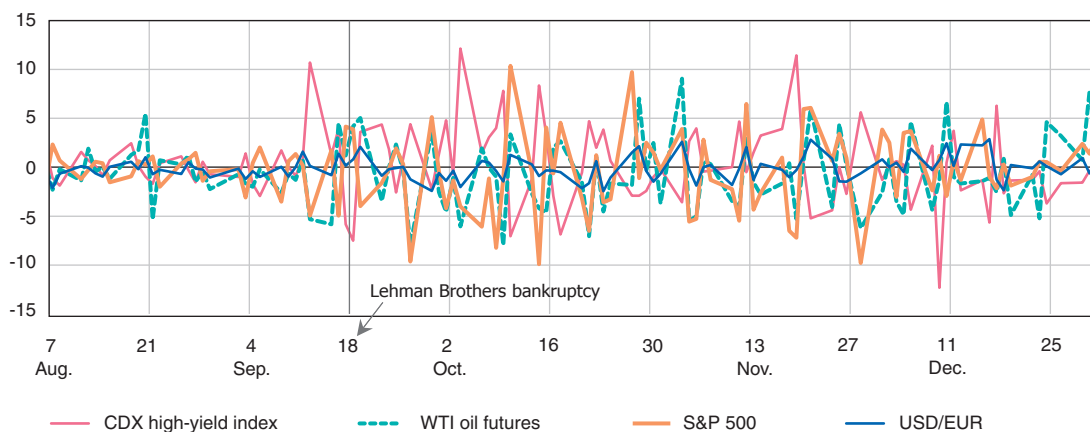
Furthermore, the actual process of replacing trades – including the ineffective "risk reduction trading session" on the eve of Lehman's default – was challenging. As all the major dealers were in a similar situation, the market became caught in something of a gridlock, as demonstrated by thin trading volumes during the post-Lehman week. Still, no other major institution failed, although it is difficult to determine *ex post* to what degree

³ *Just-in-time liquidity refers to "liquidity that must be available at a particular location, in a particular currency, and in a precise time frame measured not in days, but in hours or even minutes." Source: "Financial market utilities and the challenge of just-in-time liquidity", Federal Reserve Bank of Chicago, November, 2009.*

⁴ *Moody's (2008): "Credit default swaps: market, systemic, and individual firm risks in practice", October 2008.*

Chart 4
Market conditions before and after Lehman's bankruptcy announcement

(% change from prior day)



Source: Bloomberg

this was due to the then-unprecedented degree of government support extended to the sector.

Incidentally, the issue of trade replacement costs is not new – it was in evidence in 1998 at the time of the collapse of Long-Term Capital Management (LTCM). While dealers may have been demanding sufficient initial margin to cover the potential future exposure of an *individual* trade, competitive pressures made it impossible for firms to demand sufficient initial margin to fully cover trade replacement costs in a disorderly unwind. This was a major factor behind the industry's decision to recapitalise LTCM with USD 3.6 billion to "buy time" and organise a more controlled liquidation.

Lehman's major counterparties did not suffer significant credit losses on derivatives receivables because Lehman was subjected to and was able to meet collateral calls until the end. In this respect, the industry's standard netting and collateralisation framework worked well. Still, an important aspect of the framework failed when the counterparties (mainly, hedge funds) of Lehman's main UK subsidiary were not able to retrieve independent amount collateral (known in the centrally-cleared markets as "initial margin") they had posted to Lehman, and are now *pari passu* with senior unsecured creditors who are

facing low recoveries on their claims. This happened because customers' independent amount collateral was not legally and operationally segregated from Lehman's own collateral, as would be the case in a centrally-cleared solution.

In a way, this situation was reversed in Bear Stearns' near demise, which was compounded by a wave of novation requests by Bear's hedge fund counterparties. In a rush to reduce their exposure to Bear, hedge funds "assigned" their end of the OTC contracts to other dealers. When the hedge funds left, Bear had to return their independent amount collateral – a total of possibly several billion dollars – which had been used by Bear to fund its own operations. This became a major contributing factor to Bear's liquidity crunch. We note that following these events, the industry has proposed changes to the margining framework.⁵

Beyond the mechanics of Bear's and Lehman's crises, the market structure and practices of the OTC derivatives market also contributed to the financial crisis in other ways. Most importantly, the absence of universally applied minimum margin requirements – such as those that would be imposed by a CCP and/or by regulation – allowed certain market participants (most notably, AIG) to put on

5 ISDA (2010): "Independent Amount", Whitepaper, March.

a massive amount of market and credit risk, which, in turn, exposed all of its counterparties, and indeed the system – to counterparty credit risk. Had AIG been required to post even a modest amount of initial margin against the hundreds of billions of dollars of CDS protection it sold, this would have materially reduced the economic attractiveness of its "carry trade". As a result, it is reasonable to conclude that AIG would have either significantly curtailed its protection-selling appetite, or priced the risk differently, thus curtailing the demand.

For *some* CDS protection buyers, the ability to "get away" with minimalistic and uninformative accounting disclosures, combined with arguably insufficient capital charges, allowed them to net their longs and shorts, irrespective of the ability of protection sellers to perform. The result was the illusion of a "zero risk" carry trade. For a number of banks, this amounted to a "net-and-forget" approach to risk management, ultimately leading to large losses (in some cases, CDS protection ended up being entirely worthless), and materially weakened credit profiles. Although no market structure can prevent errors in judgment or self-deception, additional disclosures, higher capital and margin requirements, and where appropriate – central clearing – would be credit positives by reducing counterparty risk and creating a more sensible risk-reward balance in the OTC derivatives market.

Indeed, the lack of transparency of the OTC derivatives market and participants' exposures is among our key credit concerns with respect to WIBs. Wholesale investment banks do not disclose enough information publicly to paint an accurate, or even approximate, picture of their OTC derivative exposures (current and potential) to a particular sector or counterparty. As a result, in times of stress, the market's ability to accurately differentiate among the WIBs in terms of their risk exposures or their exposures to one another is very limited. Such opacity and perception of interconnectedness makes for a dangerous combination with the WIBs' confidence-sensitive funding and customer franchises. It can result in an indiscriminating withdrawal of funding and rapid and, *in extremis*, irreversible franchise erosion. This vulnerability is at the heart of what we call "transition risk" (the risk

of multiple-notch downgrades), and is a key reason why our ratings on wholesale investment banks are currently under negative pressure.

3 | CENTRAL CLEARING

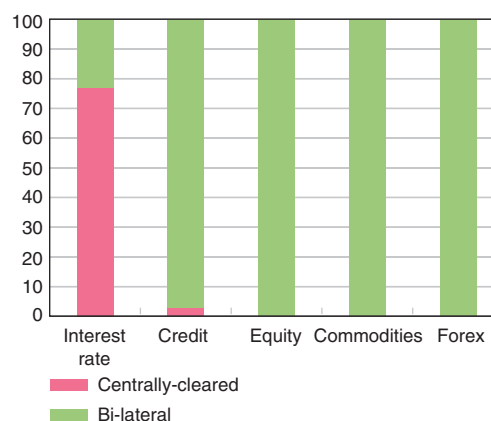
There currently appears to be strong momentum to transition much of the OTC derivatives market to central clearing. Virtually all major legislative reform proposals in Europe and the US identify central clearing as a key goal for the OTC derivatives market, notwithstanding important differences in details such as whether it is to be mandated or encouraged, who would be exempted and whether it is to be linked with exchange-based trading.

Additionally, the dealer community, and to a lesser extent the buy-side, have made tangible progress toward central clearing. Still, virtually the entire dealer-to-customer and much of the dealer-to-dealer markets remain bi-lateral (chart 5).

As noted throughout the prior section, we believe that central clearing for OTC derivatives can significantly reduce credit risks – both systemic and

Chart 5
Dealer-to-dealer OTC derivatives market

(in %)



Sources: BIS, ICE, LCH.Clearnet. Centrally-cleared data represents open interest (not cleared volume). Dealer-to-dealer data as of December 31, 2009. CDS centrally-cleared data as of February 19, 2010. Interest rate centrally-cleared data as of February 28, 2010.

for individual wholesale investment banks. The key reasons for this are as follows:

- For every counterparty that participated in central clearing, this market structure would replace multiple bi-lateral relationships with a single, fully net-able relationship with the CCP. This is referred to as multi-lateral netting and its primary benefit is the reduction of the aggregate amount of system-wide counterparty credit risk.
- A CCP would shield its counterparties from the adverse consequences of a particular clearing member's default. Because their trades would be with the CCP, these counterparties would have neither unsecured receivables nor trades in need of replacement if another clearing member defaulted.
- All centrally-cleared trades would be subject to uniform (and, presumably, conservative) daily margining. The posting of such margin – both initial and variation – would not only protect the CCP against a member's default but would also create economic disincentives against taking on undue risk exposures.
- Subject to applicable regulations and its own rules, a CCP should be able to impose concentration limits on clearing members, which would reduce – albeit not eliminate – the possibility of a material market imbalance if a large participant fails.
- Should a central clearing solution gain traction and acceptance by the end-user community, this could increase the standardised proportion of the OTC derivatives market, making more contracts eligible for central clearing. This would both improve the liquidity in the market as well as increase the netting and risk reduction benefits of central clearing.
- If a significant proportion of dealers' derivatives books are centrally cleared, this would reduce both the reality and perception of their interconnectedness, thus reducing the credit transition risk for major dealers in times of stress.
- A CCP would have up-to-date information on individual member exposures thus improving both its and regulators' ability to prepare for, and react to, market stress events.

As can be seen from the above list, central clearing is capable of mitigating many of the risks of the current market structure and practices.

However, central clearing cannot completely eliminate these risks if only because not all OTC derivatives are sufficiently standardised and liquid to be centrally cleared. The exact proportion of the market that is, or can be made standardised, is hard to estimate, but based on publicly available research,⁶ it appears to be more – possibly, significantly more – than 50%, as measured by notional amounts. We think that central clearing can be a credit positive only if it applies to contracts that are reliably liquid and price-transparent. Both conditions must be satisfied in order to facilitate daily margining (absent which a CCP cannot function as intended) *and* to ensure that a CCP can successfully liquidate a failed member's portfolio.

The latter consideration is sometimes overlooked but it is absolutely essential. As stated above, the CCP shields its members from counterparty credit risk and trade replacement costs if one of them fails. It does so by concentrating these risks within itself by being counterparty to every trade. When a member defaults, the CCP becomes exposed to market risk because its previously perfectly balanced portfolio of offsetting longs and shorts is now unbalanced. To rectify this and get back to a net-flat posture, the CCP needs to liquidate the failed member's portfolio by selling it (piecemeal or through an auction) to other clearing members (or their customers), with the failed member's initial margin and any other guarantee funds available to absorb the costs of such a liquidation. This can only be accomplished if the portfolio is composed of liquid contracts with transparent prices.

If – and for as long as – a CCP cannot liquidate the portfolio, it runs the risk of suffering potentially devastating market losses, which – if they led to the CCP's failure – could in turn have devastating systemic consequences. Similarly, if the CCP's procedures were to allow it to simply allocate the illiquid and impossible-to-price trades to the surviving members, then such an approach would seem to fall short of a CCP's stated purpose –

⁶ For example, see Goldman Sachs' research report (2009): "Effective regulation: Part 4. Turning good ideas into good outcomes", October. The report's authors estimated that more than 90% of Goldman Sachs' OTC derivatives book, as measured by notional amounts, was "standard".

to shield surviving members from the consequences of a members' default.

In summary, allowing illiquid contracts to be centrally cleared would exacerbate risks. Instead, for bespoke trades we believe that systemic and individual firm's credit risks would be reduced if market participants held higher amounts of capital as well as posted initial margin collateral into a segregated account.

Central clearing reduces risk but it also concentrates it. We think that major CCPs are and will be systemically important entities insofar as their disorderly failure would have highly adverse systemic consequences. Therefore, whether they in practice reduce or exacerbate systemic risks will depend on each CCP's risk management and operational capabilities. Furthermore, the specificity and consistency of international regulatory standards and best practices for CCPs will be very important in ensuring that competition among them does not devolve into a "race to the bottom" on margin requirements. While the recently released CPSS-IOSCO's (Committee on Payment and Settlement Systems-International Organization of Securities Commissions) guidance⁷ for CCPs is a step toward establishing such standards, the specific requirements in the area of stress tests, capital adequacy, and operational capabilities have yet to be released.

The nature and degree of competition among CCPs will also be a relevant credit consideration because a market structure with too many CCPs can introduce additional risks. Firstly, a fragmented clearing architecture can reduce netting benefits and increase collateral demands⁸ – in aggregate and for every major market participant. And secondly, if individual CCPs end up clearing only a relatively small proportion of the centrally-cleared market, their profitability and, as result, operational capabilities could come under stress – from cyclical volume declines or competitive pressures. This would be especially true of stand-alone CCPs specialising in only one assets class (CDS or OTC equity derivatives, for example) since they might not have the benefit of

revenue diversity to shield them from market share or volume declines.

Finally, one possible negative consequence of the market's embrace of central clearing could actually be the reduction in risk vigilance and consideration of creditor interests by the WIBs. Because they would no longer act as credit intermediaries (this role would be outsourced to CCPs), WIBs might have fewer business incentives to maintain strong credit profiles, which are currently necessary to win OTC derivatives business. If, as a result, the WIBs' customers become less demanding of the WIBs' to maintain strong credit profiles, this would make the risk management function of CCPs that much more critical.

4 | EXCHANGE TRADING

Exchange trading of OTC derivatives can also help reduce systemic risk, albeit at the cost of undercutting the profitability of this business for major WIBs.

Exchange trading could increase the depth of liquidity for contracts that 1) are highly standardised and fungible, and 2) can attract enough supply and demand to support reasonable exchange trading volumes. Deeper liquidity would strengthen the central clearing mechanism by improving the price transparency of traded contracts and strengthening the CCP's ability to liquidate a failed member's portfolio, as discussed above.

It is possible that exchange-based liquidity would be enhanced by electronic and high-frequency trading participants if the market offered adequate profit opportunities. However, for this to occur, the contracts would have to have sufficient end-user appeal – as hedging and/or speculative instruments – for there to be sufficient trading demand. Currently, OTC contracts that fit these characteristics (CDS indices or plain-vanilla interest rate swaps) are already highly liquid and trade with tight bid-ask spreads.

⁷ "Guidance on the application of the 2004 CPSS-IOSCO Recommendations for central counterparties to OTC derivatives CCPs", May 2010.

⁸ Duffie (D.) and Zhu (H.) (2010): "Does a central clearing counterparty reduce counterparty risk?", March.

But it is a plausible scenario that exchange-based trading would lead to higher trading volumes and even tighter bid-ask spreads. The consequences would be greater transparency and competition among market-makers. This would benefit market efficiency by transferring a portion of the bid-ask from dealers to the end users. The casualty of this would be dealers' profitability – a potential credit-negative.

Dealers generate significant revenues from OTC derivatives market-making: JPMorgan Chase, for example, has disclosed that it generated fully a third of its overall investment banking profits from OTC derivatives in 2006-2008. In large part, the profits are of a function of the absence of complete transparency into bid-ask spreads and the difficulty of electronic market-participants to offer "price improvement".

Additionally, OTC derivative revenues provide ways for WIBs to better monetise relationships with their corporate and hedge fund clients. The WIBs' ability to continue doing so would be negatively affected by open exchange-based competition.

The dealers recognise the threat of exchange trading to their profits. Because of this, mandating exchange-trading or automatically linking it to central clearing could have unintended consequences. To protect market-making and structuring spreads, the dealers could choose to reduce, as much as possible, the centrally-cleared proportion of the market by slowing down the process of contract standardisation. Put another way, if central clearing is the "ticket" to exchange-trading – a destination to which dealers do not wish to get – they may take a pass on the journey altogether.

To conclude, the current structure and practices of the OTC derivatives market contribute to the interconnectedness of large wholesale investment banks – a key vulnerability of their credit profiles. The extent of such interconnectedness and the risks it poses could be reduced by central clearing of eligible contracts and appropriate capital and margin requirements on all contracts. However, such benefits would only be realised if the systemically important CCPs are properly risk-managed and operationally sound, and do not compete on the basis of membership criteria or margin requirements.

What do network theory and endogenous risk theory have to say about the effects of central counterparties on systemic stability?

JEAN-PIERRE ZIGRAND

London School of Economics

Central counterparties (CCPs) alter the connectivity structure of financial institutions (FIs), and therefore the transmission of shocks. What does network theory have to say about the effects of CCPs on systemic stability, and how do different CCP structures (e.g. one vs multiple CCPs) alter systemic risk from a solvability point of view? CCPs not only alter the direct interconnection of FIs through their balance sheets, they also affect FIs and the links between them indirectly through prices. Prices are endogenous and are not only determined by the actions of the FIs, but they in turn constitute imperatives for FIs to act through marking-to-market and risk-sensitive constraints, both natural ingredients of CCPs. Could such feedback effects from CCPs amplify market movements and financial stress?

NB: The author would like to thank Nadège Jassaud, Manmohan Singh and Olivier Vigneron for interesting discussions.

One can imagine a wide array of reasons why in principle a move from OTC derivatives trades to central counterparties (CCPs) would have social benefits. For instance regulators would benefit from informational advantages due to one of the roles CCPs can play, namely the role of a data repository easily accessible by regulators. CCPs also can help in reducing counterparty risk through the combination of their own capital in the pooled guarantee fund as well as the initial and the variation margin posted by counterparties and the regular settlement features of profit and loss. However, little academic work has been done on this subject, and some research papers make the point that CCPs might not necessarily have social benefits only. For instance, Duffie and Zhu (2009) have shown that multiple specialised CCPs might lead to inefficient use of collateral. Some commentators have also mentioned the fact that systemic risk gets concentrated in CCPs, that the failure of a CCP would be truly catastrophic, and that if CCPs were linked in a network, there may be a domino effect of failures. On top of such balance sheet effects, the current crisis has highlighted the damage that self-fulfilling feedback effects through asset prices can have on the financial system, even in the absence of any bankruptcies. Would CCPs have reduced or inflated such externalities?

The aim in this short note is to think through costs and benefits, and to forewarn regulators and market participants of possible side effects of different CCP structures. Due to the lack of fully worked-out research papers on the subject of CCPs, we use this opportunity to imagine what the likely outcomes might be once CCPs have been integrated into a rigorous modelling of the financial system. This endeavour must be speculative by nature, but the hope is that the ideas might make policy makers aware of some of the possible unintended consequences of CCPs, both beneficial and detrimental.

We shall try to focus on those two effects that we believe will be crucial in determining whether CCPs will be able to live up to the high hopes for systemic stability that they have been endowed with: endogenous risk and interlinkages.

1 | ENDOGENOUS RISK

The first effect CCPs will have on the financial system is that they have the potential to affect price dynamics in the financial markets. Securities prices are not simply net present values of future payments as they would be in a frictionless risk neutral world. Securities prices are determined by demand and supply considerations that themselves discount such future payments in a possibly risk-averse manner, but demand and supply are also subjected to many further effects, some of them institutional. The net outcome is that prices are subjected to fundamental payoff-related risk (prices embed fundamental security-related information and are fluctuating randomly to reflect innovations in such fundamental information) and to what has become known as *endogenous risk*,¹ which is the risk impounded into securities prices by the structure of the financial system. Overall risk is the sum of those two components, and given the feedback effects and amplification mechanisms at work in the markets through the endogenous risk channel, overall risk can be many times higher than fundamental risk. This is obvious to financial practitioners, and should be obvious to those who have lived through the current crisis.

A simple analogue might be helpful at this stage. The Millennium Bridge built in London to celebrate the new millennium suffered from exactly such endogenous and destabilising feedback effects. A small gust of wind (the fundamental shock) could set the Millennium bridge to sway a tiny bit. Pedestrians crossing the bridge slightly adjusted their stance as a response, pushing the bridge further in the same direction. Provided sufficiently many pedestrians found themselves in the same situation, they felt compelled to coordinate and lockstep, and they thereby reinforced the swaying into a rather wild wobble. The resulting swaying was many times more forceful than the fundamental one, which was a tiny initial gust of wind.

Similarly, as financial conditions worsen, the willingness of market participants to bear risk

¹ See the introduction paper by Danielsson and Shin (2003) or the formal models in Danielsson, Shin and Zigrand (2010) and in Danielsson and Zigrand (2008).

seemingly evaporates even in the absence of any further hard negative news, which in turn worsens financial conditions, closing the loop. It appears to an outside observer that the "risk appetite" of a large part of the market participants disappears at the same time.² Such death spirals occur due to the coordinating effects of similar risk systems (e.g. Basel II inspired value-at-risk—VaR rules), of regular settlement and marking-to-market leading to regular margin calls.³ They also appear if delta hedgers are net short gamma or engaged in similar programme trades (the crash of 1987 or the "flash crash" of May 6th 2010 come to mind).⁴ If one financial institution (FI) needs to sell a security due to a pickup in volatility, its sale depresses prices. Other financial institutions will need to mark their positions down, will need to honour margin calls, and have their own risk systems prompting a reduction of risk because of the joint effect of higher volatility and lower capital. This in turn reinforces the downturn, and the loop closes.⁵ The effects are identical to the reinforcing locked steps on the Millennium Bridge. The prudent and conservative actions that any one individual institution takes to enhance its soundness may undermine the soundness of others. This fundamentally important insight, which can be dubbed "the *fallacy of composition*," forces regulators to rethink regulations since for the system to be safe, it is not sufficient for each institution to be safe. To the contrary, making any one institution safe may weaken the overall system depending on the precise nature of the regulations that were meant to make each institution safe. It is tempting to design regulations whose first order effects are common sensical and go in the right direction, but unfortunately one

cannot understand the mechanisms underlying financial crises without keeping this simple point in mind: in precisely the precarious situations for which the rules have been designed, the unintended nonlinear second order effects dominate the first order linear ones.⁶ Some of the regulatory responses to the crisis were more reminiscent of attempts to outlawing the gust of wind or of closing the bridge (and leaving pedestrians stranded) than to finding ways to prevent pedestrians from lockstepping.

While there probably are no reliable data on the precise extent to which financial institutions have hitherto regularly marked-to-market OTC exposures, called for collateral and managed margins and haircuts in response to market developments, it would appear that many institutions have managed such exposures to some extent as would a CCP have done. While not exactly comparable, daily collateral exchanges play the role of daily margin calls, and up-front collateral (known as the "independent amount") plays the role of the initial margin. Still, there is little doubt that a sufficiently large part of the OTC exposures have not been dealt with in this way, and some well known cases of under collateralised exposures are known.^{7 8} My guess is that for an otherwise identical amount of derivatives trade, CCPs will increase aggregate marking-to-market and regular margin calls, potentially reinforcing the existing feedback spirals. CCPs being central and systemically important, they will have no choice but to religiously insist on margining. They cannot temporarily suspend marking-to-market and regular settlement, unless governments come in with guarantees or central banks offer back-stops. Also, it would appear that over collateralisation of

2 It appears that asset returns are driven by a latent risk appetite factor. This factor is relevant to central banks that compute this factor in the normal course of events, see for instance ECB (2007) and the methodology devised by Gai and Vause (2005). Indeed, risk tolerance and financial crises are inseparable, see for instance Coudert and Gex (2008) for an empirical analysis. In Danielsson, Shin and Zigrand this risk appetite factor is endogenised and is driven by the capitalisation level of the financial sector.

3 A bank must of course mark-to-market its books for risk management purposes. The insidious effects of marking-to-market arise when through marking-to-market FIs are forced to mechanically adjust their positions.

4 For instance, Gemotte and Leland (1990) make this point. But endogenous risk is more general because the "strike price" beyond which feedback effects pick up is made endogenous. The amplifications from delta hedging of put options only occur where gamma is highest, which is around the strike, but the strikes of the portfolio protection strategies are by themselves a choice variable.

5 Contagion does not have to be limited to risky securities: with Government bailouts contagion can feed through to sovereigns, as correctly predicted by Jassaud (2009).

6 This point has been made also in Danielsson et al (2001) on the equilibrium effects of Basel II.

7 While no objective data sources seem to exist, it would appear (also see Singh, 2010) that many privileged entities (such as Freddie Mac and Fannie Mae, AAA insurers such as Berkshire Hathaway and AIG, or institutions such as European Bank for Reconstruction and Development -EBRD) have not posted upfront collateral. Also, dealer to dealer banks do not usually post collateral between each other in light of the many offsetting trades, at least not until such point as too large an imbalance builds up. Exposures to sovereigns and corporates also tend to be under collateralised. ISDA for instance states that 70% of OTC derivatives trades are collateralised, though it is not clear whether those 70% are fully collateralised, nor is it clear what fraction of OTC derivatives value is collateralised. For instance, based on a recent survey (ECB, 2009), it would appear that EU bank exposures may be collateralised well below this. Singh (2010) estimates that the degree of under collateralisation is about USD 2 trillion for residual derivative payables.

8 Notice also that hedge funds will not make much of a difference to margining given that they already post both up-front and daily collateral, and that their exposures are generally over collateralised. The regulatory scrutiny of hedge funds seems to be motivated by factors other than systemic stability.

the independent amount reduces the need for daily margin calls in the OTC world, making a move to CCPs more pro-cyclical still.⁹ This effect needs to be contrasted then to the volume of derivatives that is likely to be traded after CCPs become mandatory for the eligible contracts. There might be more trade (say since counterparty risk is lessened, or since markets become more transparent and potentially more competitive, not least due to reduced post-trade costs) or there might be less (say since trading derivatives may become more onerous and capital intensive, not least due to marking-to-market). While the net effect is not known at this stage, it would be fair to presume that both volumes and feedbacks will increase.

Now imagine an economy with more than one CCP and contrast it to the otherwise identical economy with only one CCP. Imagine FI number 1 trading with FI number 2. Imagine also that the FIs have two exposures that pretty much net out. This is a very frequent situation. If both are cleared by the same CCP, then a deterioration in the markets leads to no margin calls, and the endogenous risk channel will not be materially magnified by those two exposures. But if both are cleared on two separate CCPs with no links between the two, an increase in volatility will lead, regardless of the direction of the markets, to margin calls and a selling of risk.¹⁰ Since capital is difficult to come by instantaneously, the prudent action of any one of the two institutions involved is to reduce its overall risk, probably partly by selling risky securities, and probably by selling those risky securities that can be sold. It follows that chances are that effective risk aversion will have been increased in the markets and that asset prices fall, increasing correlations as a result, since other FIs not involved

with 1 and 2 will also need to adjust their risk. Those effects in turn will lead to the closing of the feedback loop through higher risk measures and lower capital. Evidently, this example is overly simplified (FIs will attempt to clear the trades on the same CCP), but it does provide another angle, the endogenous risk angle, to the question as to whether the number of CCPs matters. People have argued that multiple CCPs may lead to inefficient use of collateral, see for instance the recent paper by Duffie and Zhu (2010), but we would add that a further worry is that multiple poorly coordinated CCPs will not only require more collateral, they will make the collateral – and markets – potentially less safe from a macro-prudential point of view by increasing the negative externalities.

Cross-margining would mitigate this worry of an increase in endogenous risk. For instance, not only does the Options Clearing Corporation (OCC) act as a clearing house for the majority of options products traded on the majority of US exchanges, yielding netting benefits that reduce feedback loops, the OCC, ICE Clear US and the Chicago Mercantile Exchange (CME) have also operated cross-margin programmes for a number of eligible products for many years.¹¹ Initial margin is reduced as a result and net settlements are smaller. This would be the way to reduce feedback effects from margining. Another hub structure that is of a link arrangement type has been established in Europe (see Kalogeropoulos *et al.* (2007) for the details) between OMX Derivatives Markets (acting as the hub), LCH.Clearnet and VPS clearing ASA. Again, contractual arrangements have been established without a CCP being a member of the other CCPs. Maintenance margin calls across CCPs are financed in the form of cash or an increase in a bank guarantee.^{12 13} While cross-margining

9 Pro-cyclicality could also become temporarily higher if FIs move from under collateralised OTC to more fully collateralised CCPs due to the fact that collateral is typically cash or highly rated sovereigns. If FIs have trouble finding this collateral, they might then be tempted to sell out of riskier securities, raising risk aversion in the markets.

10 The same effect will appear if one exposure goes to a CCP while the other one remains bilaterally cleared.

11 In a nutshell, a joint (across CCPs) clearing account for each member is established. The OCC acts as a sort of netting agent and central hub CCP of CCPs and maintains the account, computes the relevant margins and then distributes position, margin and settlement reports to clearing members.

12 In a systemic downturn, it is likely that the values of the bank guarantees themselves drop pro-cyclically, making bank guarantees perhaps not the ideal instrument for links on a larger scale.

13 Contrast this to the ongoing debate in the European cash equity markets where LCH.Clearnet, EMCF, X-clear, Euro CCP etc. have been in the process of trying to forge "interoperability" links with each other, whereby a trader has the choice where a trade executed on a given trading venue is sent for clearing. The trader can then send all trades for clearing to the same CCP, generating an off-set of margin. Since the two counterparties to the trade may send the trade to different CCPs, cross-CCP positions arise (since one CCP now becomes a counterparty to the other one in lieu of the original counterparty) that need to be dealt with. In particular, interoperability is feared to introduce potentially systemic exposures across CCPs that a form of inter-CCP margining must address. We return to this point. The same interoperability may be established across derivatives CCPs, where CCPs and interoperability take on a role of a larger order of magnitude yet compared to cash equity. The difficulties in getting European cash equity CCPs and regulators to agree on an interoperability model in cash equities may be due to the fact that counterparty risk mitigation is relatively small in cash equities, and that it would seem rather more likely that such an agreement can be struck in the complex market of derivatives clearing where counterparty risk mitigation is crucial.

unambiguously reduces endogenous risk, we would expect cross-participation and link arrangements to do so as well, although the argument would to some extent depend on the type and liquidity of the assets held by the CCP that is a member of another CCP.

There is a related point having to do with the feedback effects caused by marking-to-market and the push towards exchange-based trading. There is no obvious solution to the fact that many securities are illiquid, which makes it hard to find the true value for mark-to-marking. The marks will appear to be the "officially correct audited market prices" and it might well be those marks that all FIs will have to use for marking their books to, even if the superior valuation capacities of a given FI imply that the FI knows the mark to be dangerously off.¹⁴ To summarise, if illiquid and immature OTC products are forced onto CCPs, not only may the CCP be poorly equipped to manage the risk imbedded in these products and run the risk of failing,¹⁵ the negative feedback externalities arising from the fact that the price set by the CCP will constitute an imperative for all counterparties to adjust their own marks, increase systemic risk. The crisis shows clearly that liquidity can dry up very quickly, and that the resulting impossibility to smoothly mark all positions to market was a contributor to the extent of the crisis. In that sense the *fallacy of composition* appears in a different context: it is not true that if all products are cleared, and therefore appear to be safe, that the system overall is safe. Indeed, it probably is safer to only require clearing of products that are mature and well understood.

Finally, endogenous risk and pro-cyclicalities may arise depending on the way the guarantee fund is replenished. If the guarantee fund is replenished through risk-sensitive rules, such as VaR, the CCP will ask for capital in periods of turmoil and will

return capital in quiet times, everything else equal.¹⁶ Uncertain times are usually times where capital of FI comes under pressure. Calls to stock up the capital at the CCP will therefore likely be met in the short run through sales of risky assets and through increases in haircuts from borrowers (such as through repos), reinforcing the pro-cyclicality of markets.

2 | INTERCONNECTEDNESS

Network theory is a relatively young branch of research in finance. Most network papers applied at regulatory or central bank level are of the pure domino type. The interlinkages are balance sheet interlinkages, and the insolvency of one bank can lead to the insolvency of another bank that is exposed to the first bank, and so on. A fair conclusion would be that these domino network models have led to the conclusion that the potential for a systemic breakdown is very small in that only implausibly large shocks fed into the simulations lead to meaningful contagion.¹⁷ This is partly due to the fact they are missing the endogenous risk component of contagion which can amplify downturns dramatically.

Let us first consider a domino type economy with no CCP. The FIs have established balance sheet links between each other, and these links are common knowledge.¹⁸ Which network is more robust to balance sheet shocks, a dense complete network, a largely disconnected sparsely linked one, or something in between?

We can use the recent model by Cabrales, Gottardi and Vega Redondo (2010) as a guide. The authors assume that the links across banks are not interbank deposits but securitisations of bank assets. Banks

14 CCPs have established procedures to try to mitigate this risk through consensus based official end-of-day settlement prices determined on the basis of market prices, prices submitted by member firms and/or theoretical model prices, and then adjusted to represent executable market prices. For instance, in 2009, ICE Clear Europe adopted procedures requiring clearing members to randomly implement trades at prices generated by their indicative settlement prices. Little academic research seems to have been done on the accuracy of this settlement price, and little information is publicly available as to the frequency and notional value of such forced trades, if any. Eurex says it implements an additional liquidity margin.

15 In order to actually fulfill its role to reduce counterparty risk, the CCP needs to figure out the right margins and the likely number of days it takes to unwind any trade that the CCP may inherit from defaulting members, as well as the required size of the guarantee fund.

16 Unfortunately, none of the CCPs seem to publish the details of their VaR and stress-testing rules governing the additional contributions to their guarantee funds. Leaving market participants in doubt as to the effects on systemic stability of those institutions that are supposed to provide the markets with systemic stability in the first place is unlikely to be reassuring.

17 For an interesting paper in this spirit with random connections, but with CDS contracts, see Cont and Minca (2009), who compute their systemic risk measure without a CCP and with one CCP.

18 We return to the question of network formation. Here, as in the vast majority of financial network papers, the network is considered as given. The assumption that the network is common knowledge is a very strong one to which we return.

securitise their assets and acquire a fraction of some of the other banks' assets. Banks can be hit with shocks whereby some of the assets turn bad. There are frequent small to medium size shocks to banks as well as the potential of a rare but large shock affecting one of the banks. The large shock is modeled using distributions that may exhibit fat tails. There is no lender or market maker of last resort. All of the structure is common knowledge. In contrast to Allen and Gale (2000), in this setup the authors find that when indeed the distribution of the shocks exhibits fat tails, an intermediate level of connectivity is on average most able to resist the propagation of shocks. In a sparsely connected network, even small shocks will ruin the affected connected banks due to insufficient securitisation, while in the fully connected network the bad shock is able to bring down the entire system (but the small shocks can be mutualised). In an intermediate system the small shocks can again be diversified, while the bad shock only brings down part of the system due to the fact that not all banks are exposed to the shock, directly or indirectly. In a nutshell, the mixture of the distributions of the small, intermediate and large shocks determine the optimal network structure.

Now let us imagine that one central node (playing the role of a non-specialised CCP) is introduced. It would then appear that each FI sells part of its overall balance sheet to the central node through securitisation. In effect, each FI then swaps part of its balance sheet with the aggregate balance sheet of all FIs linked to the CCP.¹⁹ With a single CCP, the effects should be similar to the ones in the completely connected network. With two or more CCPs that are not directly linked, and that are only weakly indirectly linked, the network would presumably be more flexible than the one with one CCP only if the big one is drawn from a fat tailed distribution. If the multiple CCPs are fully linked in the sense of swapping the securitised balance sheets of its members, the big one would bring the entire system down.

Three comments are in order.

First, most financial network models consider a network as a given or as randomly generated. They do not model the formation of the network. In Rahi and Zigrand the (static) network is determined in a network formation game whereby FIs establish links at a Nash equilibrium, each FI taking into account the links formed by all other FIs. It is shown there that network formation is subjected to a prisoners' dilemma and the equilibrium network is always inefficient. The network maximising FI value is a hub and spoke network with one particular central hub. This central hub plays the role of a CCP since all trades must pass through it and are fully collateralised. Although market liquidity is maximised, due to the prisoners' dilemma feature, this central hub must be imposed through regulations.

Second, and unfortunately, if there are multiple CCPs, the current theoretical models are unable at this stage to determine the exact form of interoperability of those multiple CCPs, whether the CCPs network is complete and either (i) making each CCP a member of each other CCP and contribute initial and variational margin or (ii) asking CCPs to set extra capital aside as a buffer against other CCPs failing without imposing any margins,²⁰ or whether indeed the CCPs should be set up in a hub and spoke network with the cross-margining undertaken by the hub as a netting agent, or any other form of linkage.

Third, the network structure in all of the network models we are aware of is common knowledge. We cannot point to any academic papers that have fully analysed the damaging effects of informational intransparency (such as the extent of under-collateralised OTC derivatives exposure of any one FI in the network with any other FI, or the fine print in the bilateral agreements among different CCPs that currently are confidential commercial contracts) on the magnification of

19 This is shown to be both the optimal and the equilibrium asset structure in a security design game where the securities are not all given but can be innovated by the FIs, see Rahi and Zigrand (2008).

20 This approach, broadly proposed by EuroCCP for cash equities, might reduce liquidity and endogenous risk up to a point.

the transmission of shocks in networks. The idea would be one of uncertainty versus risk. While the FI is not overly bothered with transparency when the party is in full swing and risk appears low, in a crisis however risk aversion increases and behaviour changes. If in a crisis a FI does not know the connectedness of counterparties and the extent to which those exposures are fully collateralised,

perhaps the FI rationally acts according to a robust control methodology, maximising its own objective function while preparing for – and expecting – the worst. This way of behaving has been put forward as a way to understand the freezing of the interbank and repo markets and the large holdings of cash by banks, which in turn made the downturn more brutal.

We can now merge the two themes of endogenous risk and of interconnections. On one hand we conjectured that a financial system with one or with multiple but fully linked CCPs (linked in the securitisation sense) may be less able to withstand the big one (if the big one hits only one of the FIs). It must be emphasised that this experiment was a static domino experiment and that market prices played no role. On the other hand, with market prices subjected to endogenous risk, multiple unlinked CCPs exacerbate the downward spirals that spread and worsen financial crises since prices coordinate the actions of all players, whether directly linked or not. Furthermore, if intransparency of the financial network reduces risk appetite in times of crisis, multiple unlinked CCPs further amplify the crisis dynamics. As often, there are two opposing effects. The net effect would depend on the trade-off between the magnitude of the initial exogenous shock and the strength of the feedback effects. Perhaps when reviewing the current crisis that emanated from the subprime segment, it would appear to this author that the latter have dominated the former in that the crisis seemed to have been made much more ferocious by the workings of the financial system itself, compared to what the initial subprime shock would have suggested, and that while Lehman's default did play a large role, the dominos created perhaps less contagion than the market price dynamics did.

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Credit default swap and bond markets: which leads the other?

VIRGINIE COUDERT AND MATHIEU GEX

*Financial Stability Directorate
Banque de France*

We analyse the links between credit default swaps (CDSs) and bonds and try to determine which is the leader in the price discovery process. As the respective sizes of the markets are quite different for sovereigns and corporates, we consider a sample including both categories. For each entity, we compare CDS premia with spreads on a generic 5-year bond. The results show that the CDS market has a lead over the bond market for corporates. Moreover, the CDS market's lead has been fuelled by the current crisis. This also holds for sovereigns, although not for low-yield countries.

Credit default swap (CDS) spreads have been particularly high and volatile since the onset of the current crisis. They surged dramatically for financial institutions in the immediate aftermath of the bankruptcy of Lehman Brothers; later on, the cost of protection for sovereign debt also soared across the board. On the one hand, these movements could be attributed to the normal reactions of markets. After all, defaults are expected to be more frequent during crises and this fundamental reason may have been sufficient to raise the cost of protection. On the other hand, credit derivatives markets have possibly overreacted during the crisis, paving the way for contagion phenomena. Both effects have certainly been at play and are entangled, as the deterioration of fundamentals has brought about risk aversion, over-pessimistic expectations about default rates and liquidity squeeze effects.

In these developments, the CDS market is often singled out, although the underlying debt market co-moves closely with it. In theory, CDS and bond spreads should be roughly equal. In practice, this equality does not hold for a number of reasons, due to the imperfect match between the two types of contracts, although both spreads are highly correlated.

Given this close relationship between CDS and bond spreads, a key issue relates to which market has the lead on the other in the price discovery process. Is it the CDS market? In this case, the bond price would adjust to CDSs. Or is it the other way round? If so, the CDS market would simply follow the bond market. In several previous studies, the CDS market has been evidenced to have the lead on the bond market.¹ In other words, innovations on the CDS market have a greater tendency to spill over to bond spreads than the other way round. However, these results need to be updated in the light of the present crisis. The remarkable expansion of new segments of the CDS market such as sovereign CDSs, which increased by 28% in 2009, may also have changed the situation.

Another important question is to ascertain how the crisis has affected the links between the two markets. Are the relations between markets disrupted or accentuated during episodes of financial turmoil? This may well happen as holding

long positions in CDSs comes down to shorting bonds, which is not always possible on the corporate bond market. Therefore, once they have sold out their long positions in debt on a risky borrower, bearish market participants are more likely to be found trading on the CDS market. Consequently, the lead of the CDS market could be enhanced during crises.

To address these issues, we consider a sample of CDSs and bonds, including banks and sovereigns from different areas and take a look at the links between their spreads.

1 | LINKS BETWEEN THE TWO MARKETS AND THEIR RELATIVE LIQUIDITY

1|1 A basic approximation

Theoretically, the CDS premium (or spread) is roughly equal to the bond spread for the same borrower and maturity. To see this, let us consider a portfolio made up of a bond and a CDS. As the CDS is meant to hedge the default risk, a long position in this portfolio is roughly equivalent to holding a risk-free asset. Therefore, the return on the portfolio, which is equal to the bond yield y_t minus the CDS premium c_t , must be close to the risk-free rate r_t . This equality can be written as: $y_t - c_t \approx r_t$. In other words, the CDS spread is approximately equal to the bond spread: $c_t \approx y_t - r_t$.

Both spreads are meant to compensate for the investor's loss in the event of the borrower's default. They thus depend on the same main determinants: the probability of the borrower's default and the expected recovery rate, as well as risk aversion factors.

In reality, bond and CDS spreads are never equal for a number of reasons, such as accrued interest,² the cheapest-to-deliver option and counterparty risk among other factors.³ Market liquidity also plays a key role in the gap between the two spreads.

¹ See for example: ECB, 2004; Norden and Weber, 2004; Blanco et al., 2005; Zhu, 2006; Baba and Inada, 2007.

² In the event of default, CDS holders can obtain the par value of the bond but not the accrued interest.

³ For a complete description of the factors at play see Olléon-Assouan (2004).

1|2 The effect of liquidity

Corporate bond markets often lack liquidity, which explains the presence of a liquidity premium in bond yields. According to different studies, CDS spreads incorporate a lower liquidity premium than bonds,⁴ especially for the 5-year maturity, which is the most traded maturity. This may result in a CDS spread that is slightly smaller than the bond spread. These liquidity effects are also decisive when determining which is the leading market. Indeed, it is the market investors are likely to turn to when they want to liquidate their positions. As expected, they will favour the more liquid market.

Several factors underpin the greater liquidity of the CDS market. First, when an investor wants to liquidate a CDS position, he does not have to sell it back on the market, he can write another contract in the opposite direction, which is of course not possible for bonds. Second, CDS contracts are not in limited supply like bonds, so they can be sold in arbitrarily large amounts. Third, the CDS market on a given borrower is not fragmented as the bond market is, being made up of all its successive issuances. Fourth, a number of investors, such as insurance companies or pension funds, purchase bonds as part of a "buy and hold" strategy, whereas CDS sellers are more active on the market.

All the factors mentioned above also apply to sovereign CDSs. However, a major difference stems from the respective size of their markets. For corporates, the CDS market has nearly outsized the bond market, as it reached USD 9.7 trillion versus USD 10.0 trillion for their long-term debt securities in September 2009.⁵ For sovereigns, the situation is radically different. The government bond market is much larger, since it has long been fuelled by large regular issuances, its amount outstanding having reached USD 36 trillion in September 2009. In comparison, the CDS market is still in its infancy, amounting to USD 1.9 trillion at the same date, in spite of a recent astonishing growth.

2| MATCHING CDSs WITH BOND SPREADS

To investigate the relationship between the two markets, we need a sample containing data on CDSs and bonds on the same entity that are exactly matched in terms of maturity. There are two difficulties to overcome: to have liquid CDSs, with reliable prices and without missing data; and to construct a generic bond of the same maturity, which requires a whole range of bonds available. These constraints lead us to consider only top issuers on the bond markets, namely some governments and major financial institutions.

The 5-year maturity is chosen because it is the most traded maturity for CDSs.⁶ For sovereigns, we use the 5-year benchmark bond yield. For financials, we have to construct a synthetic 5-year bond yield, by interpolating the yields of two bonds with lower and higher maturities.⁷

Given all the constraints, we consider a sample of CDS and bond yields on 18 governments and 17 financials.⁸ For sovereigns, as the CDS market is quite recent and lacked liquidity prior to 2007, we start from 2 January 2007. For financials, we can start a little earlier, in July 2006. All data are daily and end on 18 March 2010.

The bond spread is calculated as the difference between the bond yield and a risk-free rate. We consider a 5-year risk-free rate by area, such as the German Bund for the European Union, gilts for the United Kingdom, and the US Treasury bond for other areas.

We end up with 33 pairs of CDS and bonds spreads of the same maturity. Two of these pairs are depicted by way of example in Chart 1. As expected, the developments are fairly parallel on the two markets.

⁴ This has been evidenced by several studies, Longstaff et al. 2005; Cossin and Lu, 2005; Crouch and Marsh, 2005; Zhu, 2006.

⁵ CDS figures concern gross notional amounts of single-name CDS for non-financial corporates, source: DTCC, those for long-term securities are extracted from the BIS, Quarterly Review, March 2010. Figures for sovereigns given below are extracted from the same sources.

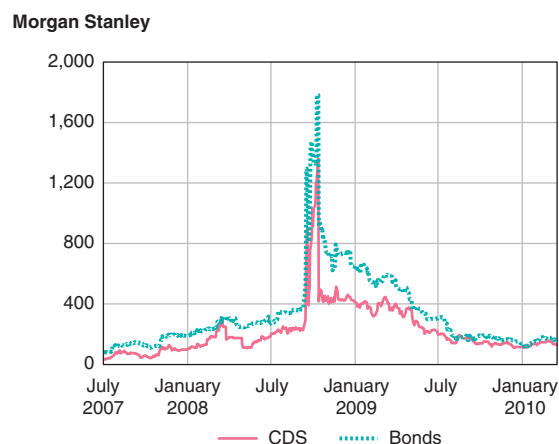
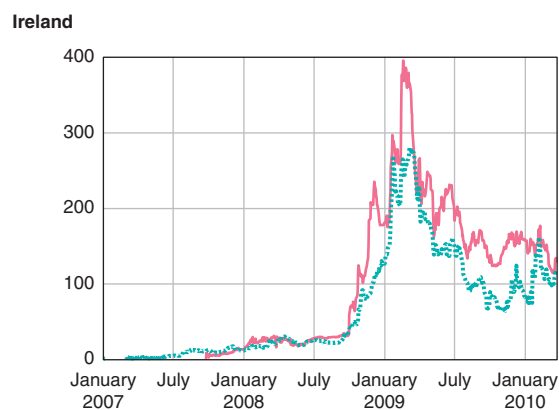
⁶ 5-year senior CDS premia are extracted from Bloomberg for financials and Datastream for sovereigns; bonds yields are taken from Bloomberg for sovereigns and Datastream for banks.

⁷ We use the same kind of method as Hull et al, 2004. The interpolation is not possible for a long period, as the maturity of bonds used in the interpolation shortens over the period.

⁸ The 18 sovereigns are: Austria, Belgium, Denmark, Finland, France, Netherlands, Greece, Ireland, Italy, Portugal, Spain; and Argentina, Brazil, Mexico, Lithuania, Poland, Turkey, Philippines. The 17 financials are: BBVA, Santander, Crédit Agricole, ING, San Paolo, Société Générale, Bayerische Hypo-und Vereinsbank, Deutsche Bank, Abbey, Barclays, HBOS; and Bank of America, Citibank, Goldman Sachs, JPMorgan, Morgan Stanley, Wells Fargo.

Chart 1
Examples of CDS and bond spreads in the sample

(in basis points)



3| EMPIRICAL INSIGHTS

Let us now try to disentangle the links between the two markets.

3|1 Adjustments to consistent levels of CDS and bond spreads

CDS and bond spreads are shown to be linked through a long-run relationship.⁹ In other words, bond and CDS spreads co-move in the long run. Consequently, every time CDS or bond spreads deviate from

one another, they are likely to get closer afterwards. The next question is how the adjustment to this long-run relation works. When there is a deviation, which spread will adjust to the other? Or will both spreads move to close the gap?

To answer this question, we estimate the speed of adjustment of both CDS and bond spreads to the gap between them. If bond spreads are found to adjust more rapidly than CDSs, this would mean that the bond market tends to follow the CDS market, more than the other way round. If this is the case, the CDS market would be leading. That is exactly what the following results suggest.

3|2 Results on the whole sample

The adjustment speeds of bond and CDS spreads to the long-run relationship are reported in Table 1. Let us first take a look at the results for sovereigns over the whole period. For example, the figure of 4.7% in the second column means that the sovereign bond spread typically closes 4.7% of the gap with the CDS spread on a daily basis. For example, if the bond spread is 100 basis points (bp) higher than the CDS, it will decrease by 4.7 bp each day in order to meet the CDS level. Symmetrically, if the bond spread is smaller than the CDS by 100 bp, it will increase each day by 4.7 bp to catch up (all other things being equal).

Table 1
Speed of adjustment of each market to the gap between CDS and bond spreads¹

(as a %)

	Whole period		Crisis period	
	CDSs	Bonds	CDSs	Bonds
Sovereigns	3.3	4.7	4.1	5.6
Financials	0.4	0.7	0.0	1.6

¹ In columns 1 and 3, changes in CDS spreads are regressed on their lagged values, lagged values of changes in bond spreads, and the lagged value of the gap between CDS and bond spreads (panel-data estimate with 5 lags). In columns 2 and 4, changes in bond spreads are explained by the equivalent regression. The absolute value of the coefficient on the latter variable is reported in this table. It represents the speed of adjustment of each market to the other. A lower adjustment speed means the market is leading the other. The leading market is indicated in bold. All the reported coefficients are different from zero at a 99% confidence level, except for the one equal to 0.0.

⁹ To show this, we run panel unit-root and panel-cointegration tests. We find a unit root for both CDS and bond spreads, for sovereigns as well as banks. The coefficient of the cointegration vector is close to 1 for sovereigns and equal to 0.5 for financials.

Conversely, the speed of adjustment of sovereign CDS to bond spreads is estimated at 3.3% (first column). Hence, both markets go a bit of the way to adjusting to each other. Nevertheless, we should note that the bond spreads adjust somewhat more strongly, which suggests a slight lead of the CDS market for sovereigns.

For financial institutions, bond spreads also adjust to CDSs (with a speed of 0.7%) more than the other way round (0.4%). This hints at a leading role for the CDS market. This corroborates results obtained in previous papers on corporate markets. It is also consistent with the greater liquidity of the CDS market.

Besides these long-term adjustments, there are also strong short-term interactions between the two markets. They can be captured by causality tests, which assess whether daily changes in each market depend on the changes observed the day before on the other market. Results show that short-run interactions are mostly bi-directional. Two-way causality is found for all the considered sovereigns at a 90% confidence level, and also for 12 out of 17 financials. For the other 5 financials, CDS spreads "cause" bond spreads in 4 cases, the reverse being found in only one case.

On the whole, short-term interactions go in both directions. Adjustments to long-run levels tell another story, evidencing a lead of the CDS market on the bond market. And these long-run effects are the most important to consider, given their lasting consequences for spreads.

3|3 The effect of the crisis and discrepancies across sovereigns

Generally speaking, the start of the crisis can be dated from July 2007 for financial institutions, whereas difficulties on public debt only materialise later, after Lehman Brothers' bankruptcy in September 2008. To see whether the crisis has affected the links between the two markets, we run the same regression again over this period.

The lead of the CDS market is somewhat strengthened, for both types of borrowers. This is evidenced by the relatively higher adjustment speed of the bond market (third and fourth columns of Table 1). For financials, it even seems that the bond market is the only one to adjust to long-term levels during the crisis. These results support the hypothesis that the CDS market leads the bond market especially in bearish times.

Another way to check this hypothesis is to split our sample of sovereigns by risk category. To do this, we construct three panels of countries of increasing risk by considering their average CDS premia. The first group comprises the countries perceived as the safest, defined by an average CDS spread below 50 bp over the whole period. Given our initial sample, it includes only six European countries (Austria, Belgium, Denmark, Finland, France, Netherlands). The second group brings together European countries with higher spreads (Greece, Ireland, Italy, Spain, Portugal). The third group is composed

Table 2
Speed of adjustment of each market to the gap between CDS and bond spreads, by groups of sovereigns¹
(as a %)

	Whole period		Crisis period	
	CDSs	Bonds	CDSs	Bonds
Group 1: Austria, Belgium, Denmark, Finland, France, Netherlands	1.2	0.3	2.1	0.5
Group 2: Greece, Ireland, Italy, Spain, Portugal	0.6	1.9	1.1	3.1
Group 3: Argentina, Brazil, Mexico, Lithuania, Poland, Turkey, Philippines	3.5	4.9	4.2	5.8

¹ In columns 1 and 3, changes in CDS spreads are regressed on their lagged values, lagged values of changes in bond spreads, and the lagged value of the gap between CDS and bond spreads (panel-data estimate with 5 lags). In columns 2 and 4, changes in bond spreads are explained by the equivalent regression. The absolute value of the coefficient on the latter variable is reported in this table. It represents the speed of adjustment of each market to the other. A lower adjustment speed means the market is leading the other. The figure for the leading market is indicated in bold. All of the coefficients reported are significantly different from 0 at a 99% confidence threshold, except for the 3 of them which are those smaller than 1. The 0.3 and 0.6 coefficients are significant at a 90% only, the 0.5 coefficient, at a 89% threshold only.

of emerging countries (Argentina, Brazil, Mexico Lithuania, Poland, Turkey, Philippines). The speeds of adjustments of these categories of countries are displayed on Table 2.

In the first group of low-yield countries, the bond spread hardly adjusts to the CDS spread. This situation persists over the entire period as well as during the crisis. This is evidenced by the weak speed of adjustment of bonds, which is hardly significantly different from 0. Consequently, CDS spreads are

not driving the borrowing costs of States in these low-yield countries. On the contrary, the bond market has the lead on the CDS market.

The situation is exactly the reverse in riskier areas. The CDS market is found to be ahead of the bond market. The adjustments are particularly strong in the emerging countries. These results also highlight that the CDS market's lead has been exacerbated by the financial turmoil in Southern Europe as well as in emerging countries.

CDS premia are expected to co-move closely with bond spreads. We check this on a sample of pairs of CDS and bond spreads for sovereigns and financials. The results show that the CDS market has a lead on the bond market in the price discovery process for corporates as well as sovereigns taken as a whole. For corporates, this is in line with the greater liquidity of the CDS market and the results found by previous studies on this topic. Moreover, the current financial turmoil has clearly amplified this role.

For sovereigns, these results are more challenging, as the size of the CDS market is still relatively small compared with the debt market. A closer look at the data shows that the lead of the CDS market only holds for high-yield countries. It is particularly pronounced in emerging areas. However, the government bond market still leads the CDS spreads in low-yield countries.

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Concentration risk and the optimal number of central counterparties for a single asset

FABIEN RENAULT

*Payment Systems and Market Infrastructures Directorate
Banque de France*

We model the central counterparty (CCP) clearing of a single asset traded over-the-counter by two groups of banks in two currencies. We compare a variety of different clearing set-ups involving one or two CCPs according to their ability to withstand a combined market and banking crisis. Using stress testing, the model shows that the question of the optimal clearing set-up for a specific asset is complex and depends on many parameters such as the level of funding available to the CCP(s), the degree of integration between the different groups of participants and the particular risk profiles of these different groups.

On the whole, however, a single CCP solution appears less resilient than a two-CCP arrangement when the magnitude of the crisis is large and only more resilient when the magnitude of the crisis is small in relation to the clearing fund of the CCP(s). Another interesting outcome is that the two-CCP set-ups perform better than the single CCP set-up for low levels of participation.

NB The views in this paper are those of the author [fabien.renault@banque-france.fr] and do not necessarily reflect those of the Banque de France. Many thanks to Margherita Redaelli, Mathieu Gex, Nadège Jassaud and Wilko Bolt for their help with this paper.

The recent crisis has shown the need to improve risk controls for OTC credit derivatives and several authorities have expressed strong support for CCP (central counterparty) clearing of OTC credit derivatives (McCreevy, 2008, FRBNY, 2008, US Treasury, 2009). As the market is moving forward in this direction, the debate has now shifted to the question of the most appropriate market set-up for the clearing of OTC credit derivatives, in particular the number and location of CCPs dedicated to this task.

Despite its crucial importance, the question as to the most appropriate set-up for the clearing of a given asset has not yet been extensively researched by academics and central bankers. A first quantitative contribution by Jackson and Manning (2007) showed that CCP clearing can offer significant risk mitigation when compared with bilateral arrangements. Another paper, from Duffie and Zhu (2009), investigates the issue of the optimal number of CCPs for a given asset. They found that whenever it is efficient – in terms of netting efficiency – to introduce a CCP, it cannot be efficient to introduce more than one CCP for the same asset.

However, when assessing the suitability of a single CCP solution as against a two-CCP set-up, it is important to take into account not only the maximum netting ratio achieved by the single CCP solution, but also the concentration of risk in a single infrastructure that this solution entails. For this reason, in this paper we use different metrics than those used in Duffie and Zhu (2009). Instead of looking at the netting efficiency, we perform a series of stress tests and consider that the most resilient set-up will be the most appropriate one. The stress tests consist in simulating the outcome of a crisis that would result in the simultaneous default of several banks together with a sharp variation in the cleared asset price, hence leading to some replacement costs for the CCPs. Should the losses incurred by a CCP exceed its clearing fund, the CCP will default, strongly affecting the smooth settlement of all trades cleared by the defaulting CCP. The metrics we use to compare and assess the different clearing set-ups is the expected average value of the trades cleared by a CCP that has defaulted.

This paper focuses exclusively on a comparison between a single CCP solution and a two-CCP set-up. A realistic comparison between bilateral clearing and CCP clearing calls for careful modelling of the domino effect that could be triggered by the default of a single bank in the bilateral clearing scenario, and would require a more complicated model. In order to take into account the potentially different risk profiles of the participants, we model a world divided in two zones with distinct currencies and populated by distinct sets of banks and we allow for the possibility that the two zones are affected by the crisis to different degrees. We study different set-ups for the clearing of a single global product over these two zones, taking into account the fact that banks can trade in both currencies and with banks from the other zone.

1 | MODELLING CCPs' DYNAMICS DURING FINANCIAL TURMOIL

1|1 Designing the financial environment

We model a world divided in two zones, which we will call respectively America and Europe for the sake of convenience. Each zone is characterised by its respective currency – dollar or USD for America and euro or EUR for Europe – and by its set of domestic banks that we will call American and European banks respectively. Both European and American banks engage in OTC trading activities on a given single asset or product (CDS in this paper). The banks are free to trade with banks that belong to their own zone or with banks that belong to the other zone. We will refer to these trades as domestic and cross-zone trades respectively. All types of trades – domestic European, domestic American and cross-zone trades – can be made in either of the two currencies. For example, two European banks can trade the asset with each other for dollars or euro.

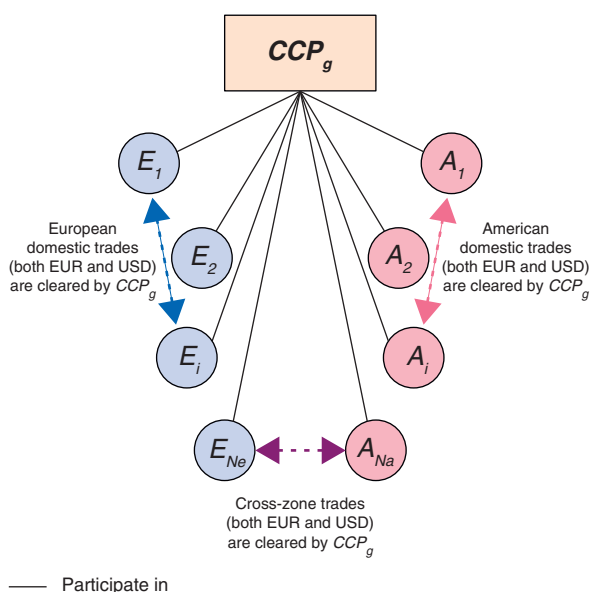
The model includes one or two CCPs that clear the OTC trades concluded between the banks. All trades

are cleared by a CCP, meaning that we do not allow for the possibility of bilateral clearing. We assume that the CCPs do not face principal risk, which is reasonable nowadays thanks to the development of delivery-versus-payment arrangements. CCPs in Europe and the US typically have three lines of defence to protect themselves against the default of a participant: margins called from the participants; a clearing fund; and the CCP's own assets. In the model, we ignore the third line of defence, or rather consider that the CCP's assets can be merged into its clearing fund. We thus assume that all CCPs rely on both a clearing fund and on margins posted by the participants (taken in the model as proportional to the absolute value of the net position of participants with regard to the asset).

1|2 Different clearing set-ups

When more than a single CCP is involved, the organisation of the clearing can take diverse forms, depending on the transactions cleared by each CCP. We do not model competition between CCPs here, and the perimeter of each CCP is taken as exogenous.

Figure 1
Participation structure and organisation of clearing in Set-up 1



Here are the different set-ups that were considered:

- **The single CCP model (Set-up 1).** There is only one CCP, called CCP_g , in which all European and American banks participate directly. This single global CCP clears all trades irrespective of the nature (American domestic, European domestic, or cross-zone) and of the currency of the trade (see Figure 1).
- **Two-CCP model with a clearing link between CCP_e and CCP_a (Set-up 2).** There are two CCPs, one American, called CCP_a , in which only American banks participate, and one European, called CCP_e , in which only European banks participate. CCP_a clears all American domestic trades (both EUR and USD) while CCP_e clears all domestic European trades (both EUR and USD). Cross-zone trades (both EUR and USD) are cleared through a bilateral clearing link established between CCP_e and CCP_a (see Figure 2).
- **Two-CCP model with a link between CCP_e and CCP_a cleared through a CCP of CCPs (Set-up 3).** Same as Set-up 2 except that cross-zone trades (both EUR and USD) are cleared through CCP_e and CCP_a 's common participation in CCP_c , a CCP for CCPs (see Figure 3).

Figure 2
Participation structure and organisation of clearing in Set-up 2

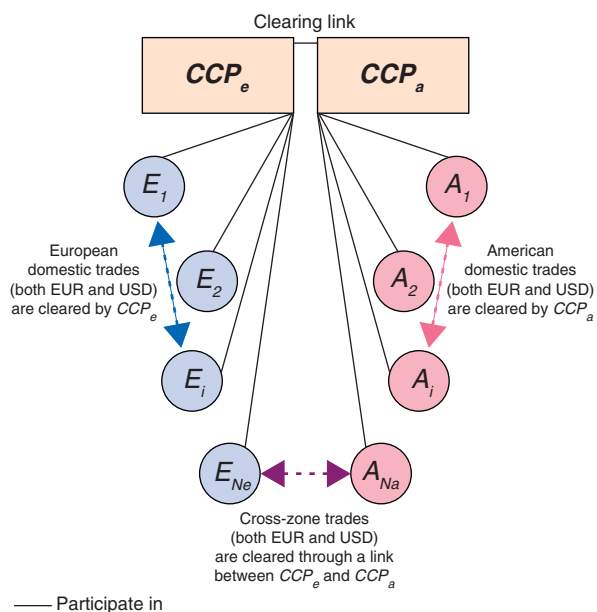


Figure 3
Participation structure and organisation of clearing in Set-up 3

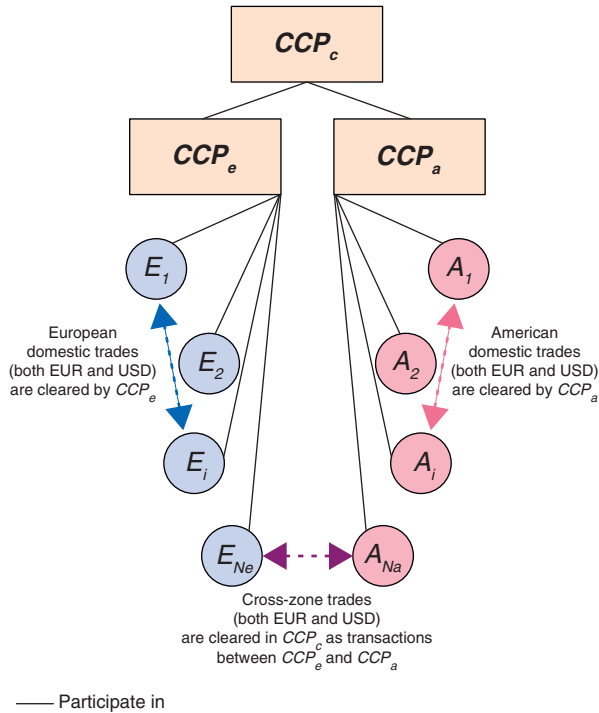


Figure 4
Participation structure and organisation of clearing in Set-up 4

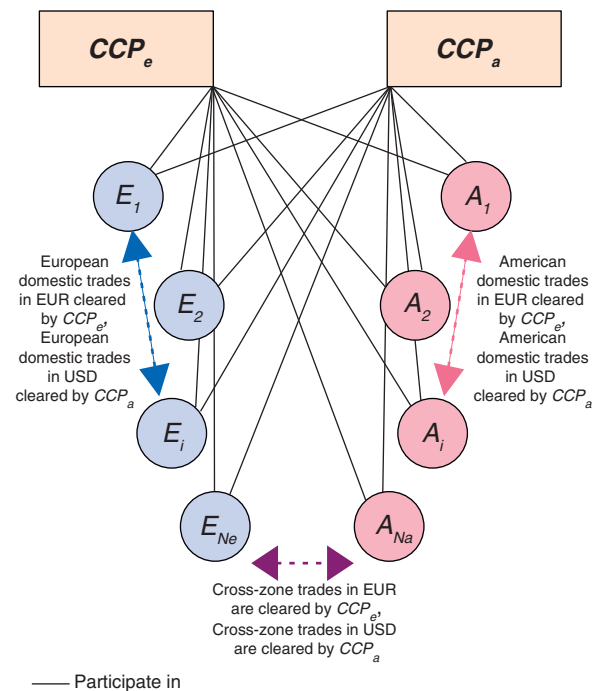
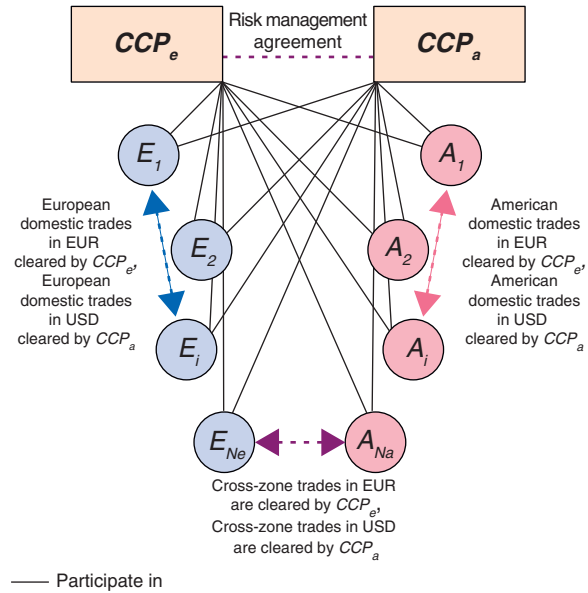


Figure 5
Participation structure and organisation of clearing in Set-up 5



- **Two regional CCPs clearing their respective currencies (Set-up 4).** All banks participate both in CCP_a (which clears all trades denominated in USD) and in CCP_e (which clears all trades denominated in EUR) (see Figure 4).

- **Two regional CCPs clearing their respective currencies, with a risk management agreement in place between the two CCPs (Set-up 5).** Same as Set-up 4, with a risk management agreement in place between the two CCPs. The risk management agreement includes cross-margining and possible transfer of positions of defaulting participants (see Figure 5).

The ability of the different aforementioned set-ups to withstand a crisis is investigated in the following section. CCP guarantee funds were chosen so as to ensure compliance with CPSS-IOSCO (Committee on Payment and Settlement Systems and International Organization of Securities Commissions) Recommendation 5 for Central Counterparties (BIS, 2004) which requires CCPs to “maintain sufficient financial resources to withstand, at a minimum, a default by the participant to which it has the largest exposure in extreme but plausible market conditions.” In order to allow for a fair and meaningful comparison between the different set-ups, the total amount of cash immobilised (margins + guarantee funds) is always the same in all set-ups. Thus in the two-CCP set-up, the sum of the guarantee fund of the two CCPs is equal to the guarantee fund of the single CCP in the single CCP arrangement.

2 | TESTING THE RESILIENCE OF THE DIFFERENT CLEARING SET-UPS

2|1 Crisis model and testing metrics

As CCPs only face replacement cost risk in the model, they are only vulnerable to a participant's default simultaneous with a large market movement. Thus, the model includes both a market crisis, represented as a large and sudden drop in the asset price, and a banking crisis, represented as the simultaneous failures of several banks. The bank defaults are modelled by giving each bank a certain probability of default, which leads to a random number of defaults, rather than by imposing a certain number of defaults. Such an approach was thought to more realistically capture the nature of global crises. For example, with 100 banks in each zone, imposing a 3% default probability for all banks in both zones can lead to 3 defaults in each zone (with a probability of 5%) or to 1 default in one zone and 4 in the other zone (with a probability of 2.5%). The two zones having the same risk profile only means that the average expected number of defaults will be the same in both zones, not that the actual realisation of the crisis will be systematically the same in both zones.

The bank defaults will lead to losses for the CCPs, which will be covered by the margins posted by the defaulting banks and by the CCPs' clearing fund. A CCP is considered as defaulting when its clearing fund is unable to cover all of its losses. A series of simulations were performed using an OCTAVE¹ implementation of the model described, with the objective of trying to assess the previously presented clearing set-ups. The impact of the crisis is characterised by the total value of affected trades. A given trade is considered "affected" if and only if the CCP clearing this trade has defaulted, regardless of the possible default of the two banks at the origin of the trade.

2|1 The model's findings

The relative performance of the set-ups will depend on the topology of the cleared transactions (including

the number of participating banks, the number of transactions, the degree of integration between the two zones, the proportion of transactions that are concluded in the home currency), on the level of margins and guarantee fund of the CCPs, and on the type and magnitude of the crisis (which can affect only one of the two zones or both, and can be severe or mild). Each of these parameters was varied away from a base case in order to investigate the effects at work. Despite the model's limitations, it yields the following findings.

The first finding is that a two-CCP solution is more resilient than a single CCP when the magnitude of the crisis is large. This effect is greatest when the crisis affects only one of the two zones. Basically, a single CCP allows for the mutualisation of the losses between the two zones, which is effective in weathering mild local crises but allows the propagation of local crises from one zone to the other.

The second finding is that a two-CCP solution appears all the more appropriate when the degree of integration between the two zones considered is moderate. When there is a low level of integration between the two zones, a two-CCP solution allows for perfect insulation of the two zones, and thus provides a very high level of resilience against severe local crises.

The third finding is that the level of participation has a complex effect on the resilience of CCPs. All other things being equal, increasing the number of participants decreases the uncertainty of the outcome. This tends to make the situation better or worse depending on the existing balance between the level of funding of the CCP(s) and the magnitude of the crisis. An interesting and to some extent unexpected outcome is that a high level of participation does not favour the two-CCP set-ups compared to the one-CCP set-up. On the contrary, two-CCP set-ups perform better than the single CCP set-up for low levels of participation.

The fourth finding is that when more than one CCP is involved, the organisation of the clearing between the different CCPs plays an important role. In particular, the existence of risk management agreements between the CCPs (such as cross-margining and the transfer of the position of the defaulting participants) is shown to greatly increase their resilience.

¹ www.octave.org

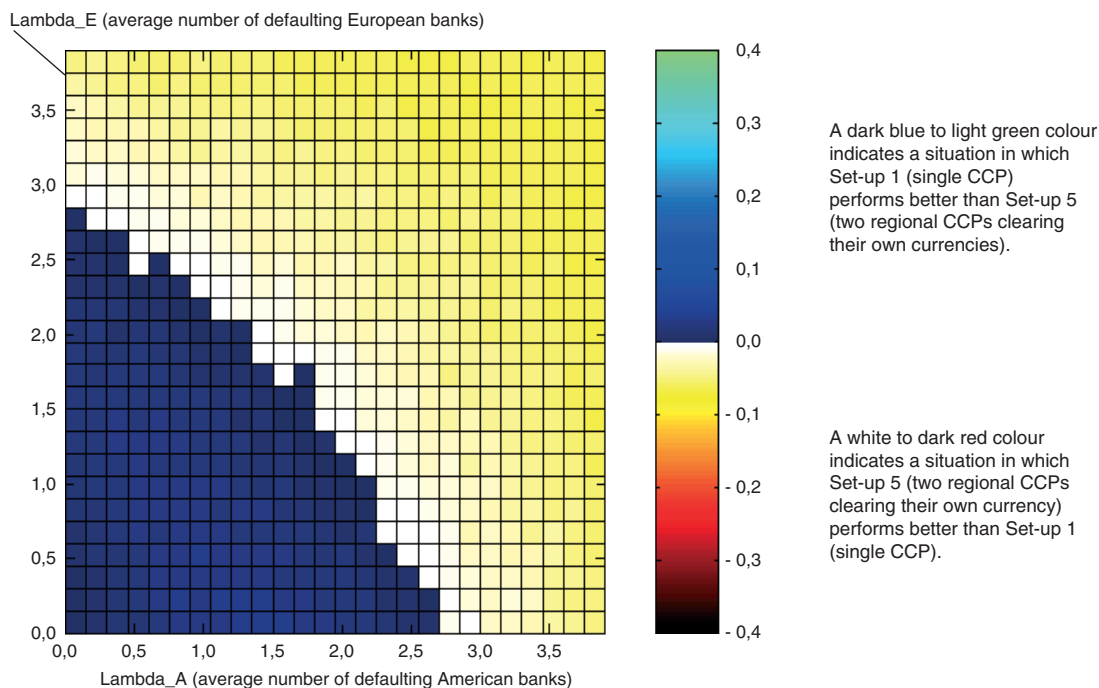
2|3 Assessing clearing resilience empirically

In addition, we make an initial attempt to apply the model to the clearing of credit derivatives. To do so, we select a sample of major US and European credit derivatives dealers² and use public data from banks' financial statements and supervisory reports (Office of the Comptroller of the Currency's quarterly report³ on bank trading and derivatives activities).

Regarding the clearing of credit derivatives, Set-ups 4 and 5 (two regional CCPs each clearing their own currency) are probably the most appropriate two-CCP set-ups since they would allow access to central bank money for each of the two CCPs. As Set-up 5 combines some interesting features of the single CCP set-up and of the two-CCP arrangement, it was the chosen set-up for this investigation. Figure 6 presents a comparison between

Set-up 5 and Set-up 1 (the single-CCP set-up). The x-axis corresponds to the magnitude of the banking crisis in the American zone and the y-axis to the magnitude of the banking crisis in the European zone. Each cell results from the averaging of 10,000 simulations performed, and the colour of the cell provides the average difference between the observed fraction of trades affected by the crisis in set-up 5 and in set-up 1. According to the chosen colour scale, a dark blue to light green colour corresponds to crisis parameters for which set-up 1 is more resilient (fewer affected trades), while a white to dark red colour corresponds to crisis parameters for which set-up 5 is less resilient (more affected trades). Figure 6 clearly shows that a two-CCP set-up would be more resilient than a single CCP arrangement for severe crises. Using these real data, it confirms that a single CCP set-up might not be the most appropriate solution in terms of financial stability. However, this warrants being validated by further research using real trade-by-trade data.

Figure 6
Compared impact of the crisis in Set-ups 5 and 1
Impact of the crisis in Set-up 5 minus impact of the crisis in Set-up 1



² We consider banks whose notional amount of traded credit derivatives is above USD 1,000 billion. We obtain the following sample of American banks: JPMorgan, Bank of America, Goldman Sachs, Morgan Stanley, Citigroup; of European banks: Deutsche bank, Barclays, BNPP, Société Générale, Crédit Agricole, HSBC.

³ The OCC report is available at www.occ.treas.gov/deriv/deriv.htm.

The model shows that the question of the optimal number of CCPs for a specific market is extremely complex and depends on many parameters such as the level of funding available to the CCP(s), the degree of integration between the different zones that make up the market and the particular risk profiles of these different zones. In particular, the likelihood of a severe local crisis is of prime importance.

There is therefore no general answer to the question as to the optimal number of CCPs for a specific market and only a case-by-case detailed analysis could provide some insight into the most efficient solution to be implemented. This would require a more comprehensive assessment using real net exposures data on all types of products. Furthermore, risks other than credit risk should be taken into account. For example, a global CCP clearing multiple currencies will typically rely on one or several commercial settlement banks to operate. Thus it would face higher settlement bank risk than a CCP operating in a single currency that uses the central bank as settlement agent. More generally, swift access to central bank money has proven to be extremely important for CCPs in times of crisis.

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Les CDS : quels avantages et coûts sociaux ?

RONALD W. ANDERSON

London School of Economics

Les *credit default swaps* (CDS) sont des contrats dérivés qui permettent à des acheteurs de protection de transférer le risque de défaut d'un crédit sous-jacent vers d'autres agents financiers, les vendeurs de protection. À l'instar d'autres produits dérivés, certains contrats de CDS davantage standardisés que leurs sous-jacents, contribuent à renforcer la liquidité du marché, laquelle permet à son tour de faciliter le transfert du risque et le processus de découverte des prix. Les CDS peuvent ainsi contribuer à une valorisation précise du risque de crédit et, au final, réduire les coûts de financement. Cependant, comme les autres produits dérivés, les contrats de CDS peuvent faire l'objet de manipulations de marché, ce risque étant

d'autant plus grand que le marché au comptant sous-jacent n'est pas transparent. Toute analyse en termes de coût sur bénéfice des CDS devra tenir compte de ces aspects d'amélioration de la liquidité, de transfert du risque et de découverte des prix. Nous analyserons l'équilibre de ces arbitrages dans le cadre d'un CDS mono-émetteur (*single-name corporate*), d'un CDS indiciel, d'un CDS souverain, et enfin, d'un CDS sur tranches de produits de crédit structurés. Nous examinerons également d'autres coûts potentiels des CDS, notamment le risque de « rendre économiquement trop favorable la vente à découvert » et de favoriser l'instabilité sur les marchés, en facilitant les attaques spéculatives.

Fiat lux – jetons un jour nouveau sur les marchés de produits dérivés

MICHEL BARNIER

Commissaire au Marché intérieur et aux Services financiers, Commission européenne

Il n'y a pas si longtemps, nous pensions connaître les principaux défis auxquels l'Europe devait faire face pour tirer le meilleur parti de la mondialisation, en bâtissant un modèle économique plus durable : ces défis étaient le changement climatique et le vieillissement rapide de la population. Or, depuis 2007, nous avons appris qu'il était un autre secteur qui méritait, lui aussi, toute notre attention : le secteur financier. De fait, ce qui a démarré en 2007 comme une crise du crédit sur le marché américain des crédits hypothécaires *subprime*, s'est transformé en 2008 en une crise financière mondiale à la suite de la défaillance de Lehman Brothers. Cela nous a ensuite conduits au bord d'une crise de la dette souveraine, du fait

notamment des conséquences budgétaires de l'instabilité financière, s'ajoutant à un endettement public déjà élevé.

Cette situation met en lumière l'importance du système financier pour la société toute entière et, partant, l'impératif politique de l'améliorer afin que la finance soit au service de l'économie réelle, et non l'inverse. En conséquence, nous devons adopter un ensemble de règles et de principes nouveaux, à même d'assurer la stabilité et la viabilité du système financier. Si nous n'accomplissons pas les réformes nécessaires, nous empêcherons notre économie de retrouver le chemin de la prospérité, et de faire ainsi face aux défis de demain.

Dette publique et interactions avec les marchés dérivés : le cas européen

LAURENCE BOONE, LAURENT FRANSOLET ET SØREN WILLEMANN

Barclays Capital

À l'image des crises précédentes, les dépenses publiques dans les pays de la zone euro — ainsi que dans tous les autres pays de l'OCDE — ont fortement augmenté. Il existe cependant trois particularités majeures dans la crise actuelle : sa synchronisation entre les différents pays, les niveaux de dette atteints et enfin l'existence

du marché des CDS, qui a influencé la dynamique des transactions sur la dette souveraine. Dans cet article, nous examinerons rapidement la situation des fondamentaux puis nous mettrons en évidence le rôle du marché des CDS et son incidence sur les transactions de la dette souveraine.

Les produits dérivés : le point de vue d'un assureur

HENRI DE CASTRIES ET BENOÎT CLAVERANNE

AXA Group

L'utilisation de produits dérivés est un élément indispensable à la gestion des risques des compagnies d'assurance, tant au regard de leur modèle économique que de leurs engagements envers les assurés. Comparativement aux autres intervenants financiers sur les marchés dérivés, les compagnies d'assurance présentent toutefois certaines spécificités : de fait, elles utilisent ces produits principalement pour se couvrir et ne prennent pas – structurellement – de positions à effet de levier. Ainsi les instruments dérivés sont-ils une réalité pour un assureur comme AXA. L'application

de la directive Solvabilité II se traduira d'ailleurs très vraisemblablement par un recours accru aux produits dérivés aux fins de couverture. Si la crise financière a montré que la gestion des risques liés aux dérivés devait être significativement améliorée, ces derniers ont également prouvé leur utilité et résilience. Une meilleure réglementation des dérivés est donc nécessaire et les assureurs soutiennent les initiatives réglementaires en cours mais en tout état de cause, le rôle déterminant des contrats de gré à gré pour la profession doit être reconnu.

CDS et stabilité financière

RAMA CONT

CNRS et Columbia University

Initialement destinés à servir d'instruments de couverture et de gestion du risque de crédit, les CDS ont été accusés durant la crise récente de porter atteinte à la stabilité financière. Nous soutenons dans cet article que l'incidence des marchés de CDS sur la stabilité financière dépend essentiellement des mécanismes de compensation et des exigences en liquidité et en fonds propres qui s'appliquent aux principaux vendeurs de protection. En particulier, les vrais « responsables » de cette instabilité ne sont pas tant les CDS spéculatifs ou les CDS « nus » que l'insuffisance de la gestion du risque et de

la surveillance des vendeurs de protection. Lorsque ceux-ci sont insuffisamment capitalisés, les marchés des CDS de gré à gré peuvent faire office de vecteurs de contagion et favoriser le risque systémique. En revanche, un marché où tous les principaux intermédiaires participent à une infrastructure de compensation centrale avec des réserves suffisantes peut contribuer à réduire le risque systémique de manière effective. Dans ce cas, l'élément central est la gestion du risque des contreparties centrales, pour laquelle nous formulerons quelques recommandations.

Les contrats de CDS - Innovation ou dysfonctionnement de la finance ?

SATYAJIT DAS

Consultant en risque

Les contrats de CDS étaient, à l'origine, destinés à renforcer la résilience des institutions financières, en transférant et dispersant le risque de défaut au sein des marchés financiers. La crise financière a toutefois révélé que les contrats de CDS, loin d'atteindre ces objectifs, peuvent au contraire accroître l'effet de levier au sein du système

et aggraver les risques systémiques. La complexité de leur documentation, leur risque de contrepartie et de concentration ont contribué à aggraver la crise. Les contrats de CDS sont une innovation financière importante mais ils sont également source de dysfonctionnement financier et dans certaines circonstances, de risque systémique.

Faut-il interdire la spéculation sur les marchés des obligations souveraines ?

DARRELL DUFFIE
Stanford University

L'étude cherche à évaluer si la spéculation sur les CDS a renchéri les coûts des emprunts des émetteurs souverains en zone euro. Certains éléments empiriques, sur la base d'une étude en cours avec Zhipeng Zhang, tendent à apporter une réponse négative à cette question.

L'étude cherche également à qualifier le rôle joué par les spéculateurs sur les marchés de CDS. Les réglementations qui limitent fortement la spéculation sur les CDS peuvent

avoir trois conséquences involontaires ; une diminution de la liquidité du marché, une augmentation des coûts de transaction pour les investisseurs qui ne spéculent pas et enfin un appauvrissement de la qualité de l'information fournie par les CDS, sur la qualité de ces émetteurs souverains. Par conséquent, ces réglementations sont susceptibles d'accroître le coût des emprunts des émetteurs souverains, ce qui plaide en faveur d'approches réglementaires alternatives.

Les marchés dérivés de gré à gré en Inde : évolution et perspectives

SHYAMALA GOPINATH
Sous-gouverneur, Reserve Bank of India

Le présent article s'attache à mettre en perspective les facteurs économiques qui ont guidé le développement progressif des marchés de gré à gré (*over-the-counter* – OTC) en Inde. Il défend également l'idée d'un passage graduel vers un modèle de marchés organisés.

En Inde, contrairement aux marchés financiers développés qui ont connu une croissance exponentielle des innovations financières complexes et non réglementées au cours des deux dernières décennies, les marchés de gré à gré ont évolué au sein d'un espace réglementé. Ce cadre réglementaire inclut une spécification générale des produits devant être homologués, la nature des intervenants sur les marchés, les responsabilités distinctes des teneurs de marché et des utilisateurs de l'ensemble des produits dérivés de gré à gré,

ainsi qu'un dispositif de déclaration des transactions, pour permettre une surveillance systémique.

Le marché indien des produits dérivés de gré à gré de change et de taux d'intérêt devrait continuer de fonctionner dans un cadre réglementé avec une transparence accrue. D'autres pistes sont également à explorer afin de renforcer le fonctionnement des marchés de gré à gré, comme l'accroissement de la standardisation des dérivés de gré à gré et l'extension, dans la mesure du possible, des dispositifs de compensation par contrepartie centrale pour ces contrats. Des travaux ont déjà été engagés afin de concevoir un système de déclaration des transactions centralisé pour tous les produits dérivés de gré à gré, en vue d'une meilleure surveillance systémique et d'une plus grande transparence des marchés.

Produits dérivés de gré à gré et compensation centrale : toutes les opérations peuvent-elles faire l'objet d'une compensation ?

JOHN HULL
Université de Toronto

La crise financière de 2007-2009 a conduit les pouvoirs publics, des deux côtés de l'Atlantique, à proposer des lois imposant une compensation centrale pour la plupart des dérivés de gré à gré (OTC) « standardisés ». Cet article examine ces projets. Même si les dérivés OTC n'ont pas été directement à l'origine de la crise, ils facilitent cependant la spéculation et peuvent induire un risque systémique. S'ils sont adoptés, ces projets de loi auraient pour principal mérite d'accroître la transparence des positions sur les dérivés standardisés. Cependant, la crise a révélé que ce

sont souvent les positions prises par les établissements financiers sur des dérivés de gré à gré non standardisés qui subissent d'importantes pertes. L'une des solutions, présentée ici, consisterait à instaurer d'ici trois ans une compensation centrale pour tous les dérivés, standardisés et non standardisés. Cette mesure maximiserait les avantages de la compensation des positions (*netting*) tout en permettant aux régulateurs d'effectuer plus facilement des *stress tests*. Cet article propose un mode de compensation pour chacune des catégories de dérivés de gré à gré.

La finance du XX^e siècle ne peut faire l'économie d'une bonne régulation des marchés de dérivés de gré à gré

JEAN-PIERRE JOUYET

Président, Autorité des marchés financiers

Les produits dérivés échangés de gré à gré ont été fort justement pointés du doigt pour leur rôle dans le déclenchement et la propagation de la crise financière. Il est vrai qu'ils peuvent être sources de risques, d'arbitrage réglementaire, de complexité, voire d'instabilité du système financier. Mais ils contribuent aussi au financement de l'économie et au bon fonctionnement des marchés. Il faut donc une régulation appropriée de ces produits, pour en conserver les avantages et en modérer les risques. Cette régulation ne peut pas être envisagée sous le seul angle prudentiel. Il revient au régulateur des marchés de prendre sa part dans l'élaboration d'un cadre

réglementaire rénové de ces marchés. Ceux-ci devront être plus transparents. Leur organisation même devra évoluer. Le Comité des régulateurs européens propose une feuille de route fondée sur la déclinaison du triptyque standardisation, compensation, enregistrement et la création des infrastructures de marchés correspondantes. Au-delà, il faut même envisager une refonte plus ambitieuse encore des cadres de régulation nationaux et européen dont les paramètres avaient été conçus avant l'explosion des transactions sur produits dérivés. Ils doivent désormais intégrer cette dimension nouvelle des marchés modernes.

Une solution au problème des établissements d'importance systémique fondée sur l'organisation industrielle

JEAN-CHARLES ROCHET

Swiss Finance Institute, Université de Zurich et École d'Économie de Toulouse

Cet article préconise une réforme de l'organisation des marchés monétaires qui éliminerait, en grande partie, le risque de contagion. La notion d'« institution d'importance systémique » serait remplacée par celle de « plate-forme d'importance systémique ». De telles plates-formes seraient directement accessibles uniquement à un ensemble d'« institutions financières reconnues officiellement », qui devraient respecter des exigences réglementaires spécifiques et seraient directement soumises à la surveillance de la banque centrale. Le statut « d'institution financière reconnue officiellement » pourrait être retiré

par la banque centrale en cas de non-respect des exigences réglementaires spécifiques. L'adoption d'une procédure de résolution spéciale conférerait à la banque centrale la capacité juridique de procéder à la fermeture de ces institutions, ou, au moins de restreindre leurs activités avant qu'il ne soit trop tard. Les marchés de gré à gré seraient toujours actifs mais, dans la mesure où ils seraient pénalisés par la réglementation, il est vraisemblable qu'ils perdraient en importance et, par conséquent, ne représenteraient plus une menace pour l'ensemble du système.

Produits dérivés OTC : défis pour la stabilité financière et réponses des autorités

DANIELA RUSSO

Directeur général des Infrastructures de paiements et de marché, Banque centrale européenne

La crise financière a souligné l'importance du bon fonctionnement des marchés de produits dérivés de gré à gré au regard des objectifs de stabilité financière. Les autorités publiques ont ainsi adopté une série de mesures qui visent à renforcer la solidité de ces marchés. Le présent article fournit une vue d'ensemble de ces différentes actions réglementaires. Il revient tout d'abord sur les enjeux du bon fonctionnement des marchés de produits dérivés de gré à gré, puis met en avant les

principales leçons de la crise financière. Il s'intéresse ensuite aux principaux outils disponibles : l'utilisation d'infrastructures de marché robustes – les contreparties centrales et les dépositaires centraux de données –, l'amélioration de la gestion bilatérale des risques et enfin la coopération entre régulateurs, autorités de surveillance des infrastructures et contrôleurs bancaires. Enfin, l'article dresse un bilan provisoire des principales actions menées dans ces domaines.

Sous-collatéralisation et « réhypothéca­tion » sur les marchés des produits dérivés de gré à gré

MANMOHAN SINGH

Économiste sénior, Département des marchés monétaires et de capitaux, Fond monétaire international

Aujourd'hui, une grande partie de l'activité sur le marché des produits dérivés de gré à gré est sous-collatéralisée. Les contreparties centrales (CCP) devraient permettre d'améliorer le niveau de collatéralisation des marchés dérivés, et réduire ainsi le risque de contrepartie associé. Toutefois, cet avantage liée à la compensation centralisée ne sera pas maximum si les différentes contreparties centrales actives sur le marché

ne sont pas reliées entre elles (ou interconnectées). En outre, dans le cadre des marchés de gré à gré, les grandes banques réutilisent souvent le collatéral reçu, assorti d'un droit de réutilisation, ce qui ne sera plus possible dans le cadre de la compensation centrale. La compensation des produits dérivés de gré à gré par des contreparties centrales risque donc d'induire un coût en collatéral élevé.

Silos et silences : les difficultés à déceler les problèmes liés aux instruments de crédit complexes et les implications pour l'avenir

GILLIAN TETT

Journaliste financière, Financial Times

Pourquoi aussi peu d'acteurs, tant à l'intérieur qu'à l'extérieur de la sphère financière, ont-ils identifié les risques qui émergeaient dans le secteur des dérivés de crédit et autres produits complexes ? Comment expliquer cet échec des régulateurs et des autorités ? Si ces questions ont provoqué d'innombrables débats depuis le début de la crise bancaire, elles ont également suscité des réponses très variées.

En effet, certains observateurs estiment que cet échec est celui des pouvoirs publics et banquiers centraux, qui ont trop fait confiance à l'auto-discipline des marchés. Pour d'autres, il y a eu « dissimulation », dans le sens où

les banquiers ont délibérément dissimulé aux régulateurs les risques importants qu'ils prenaient. La question de la « capture réglementaire » par l'industrie a également été incriminée : le secteur bancaire était effectivement, durant ces dernières années, tellement prospère et puissant que son influence – par l'intermédiaire, plus ou moins visible, de ses groupes de pression ou de ses attaches politiques – a pu obérer la capacité des autorités (et d'autres acteurs) à surveiller efficacement les marchés de dérivés de crédit, par exemple. Selon cette dernière théorie, les banques ont pu ainsi engranger des bénéfices considérables, et ce, pendant plusieurs années sans que les régulateurs ne puissent les en empêcher.

Réduire le risque systémique sur les marchés de dérivés de gré à gré

NOUT WELLINK

Président, Comité de Bâle sur le Contrôle bancaire

Président, De Nederlandsche Bank

L'expérience récente a montré que les turbulences sur les marchés de dérivés de gré à gré pouvaient constituer un facteur d'aggravation de la crise financière. Il s'agit dorénavant pour les responsables politiques de réduire les risques que ces marchés font peser sur le système financier. Favoriser l'accroissement du rôle de la compensation par contrepartie centrale constitue en ce sens, un pas dans la bonne direction, dans la mesure où le risque de contrepartie se trouvera réduit, et la transparence, améliorée. Cependant, une telle évolution ne peut constituer qu'une réponse partielle, les systèmes de gestion des risques des contreparties centrales (CCP) n'étant pas nécessairement équipés pour

assurer la compensation de tous les types de contrats sur dérivés. En outre, une compensation avec contrepartie centrale tend à concentrer les risques, ce qui peut aggraver le risque systémique. Dès lors, il est essentiel que les CCP disposent de systèmes de gestion des risques robustes. Par ailleurs, le renforcement de l'intégrité et de la transparence du marché de gré à gré mérite également notre attention, car une partie de ces transactions continuera d'être compensée de cette manière. Au regard du caractère international des marchés de dérivés de gré à gré, la coordination entre les autorités nationales de surveillance et de régulation est la clé du succès de toute initiative en la matière.

Credit default swaps : quels sont les risques et défis en matière de stabilité financière ?

ORICE WILLIAMS BROWN

Director, Financial Markets and Community Investment, US Government Accountability Office

Les CDS font peser sur les établissements de crédit et les marchés un certain nombre de risques, qui, pour nombre d'entre eux ne sont pas spécifiques à ces instruments, notamment le risque de contrepartie, opérationnel, de concentration ou de défaillance immédiate. Mais les CDS sont également porteurs d'autres risques qui posent des défis particuliers. Ainsi, leur faible transparence a amplifié les phénomènes de défiance et d'incertitude quant à l'exposition globale et la valorisation des positions des principaux intervenants financiers. En outre, des régulateurs ont constaté certaines manipulations de prix qui ont pu influencer d'autres marchés, tel que le marché boursier par exemple. D'autres régulateurs se

sont enfin inquiétés de l'utilisation des CDS à des fins spéculatives, notamment les positions « nues » ou non couvertes sur CDS, c'est-à-dire lorsque l'une des parties prenantes à un contrat de CDS ne détient pas l'obligation ou l'entité de référence sous-jacente. Bien que les régulateurs et les intervenants de marché observent que certains autres produits dérivés de gré à gré sont, à des degrés divers, porteurs de risques similaires, en particulier les dérivés actions, la réglementation américaine relative aux CDS ne prévoit pas un régulateur unique pour l'ensemble des marchés des CDS, ce qui rend difficile la surveillance et la gestion de leur risque systémique potentiel.

Structure des marchés de produits dérivés de gré à gré et impact sur les revenus des grandes banques d'investissement

ALEXANDER YAVORSKY

Vice president – senior analyst, Financial Institutions Group, Moody's Investors Service

Le marché des produits dérivés de gré à gré se trouve aujourd'hui à un tournant de son histoire : une réforme réglementaire a été engagée, les attentes des utilisateurs finaux ont évolué et enfin le modèle des bourses et des marchés organisés exerce une pression concurrentielle. Tous ces éléments auront nécessairement un impact sur le profit que les grandes banques internationales retirent des activités de gré à gré. Pour répondre à ces défis, plusieurs réponses sont aujourd'hui possibles : encourager la compensation par

contrepartie centrale des 600 milliards de dollars de dérivés de gré à gré, inciter à leur négociation sur des bourses et enfin leur imposer des exigences plus strictes en matière de fonds propres, de collatéral et de transparence. Chacune des trois réponses possibles ainsi que leur combinaison auront nécessairement un impact sur les risques systémiques et individuels. Autre élément d'évolution, nous assistons à l'émergence de nouveaux établissements d'importance systémique (les contreparties centrales).

Contreparties centrales (CCP) et stabilité financière : quelles leçons tirer de la théorie des réseaux et du risque endogène ?

JEAN-PIERRE ZIGRAND

London School of Economics

L'interposition de contreparties centrales altère le réseau d'interconnexions entre institutions financières, et par conséquent les canaux de contagion. Aussi, la présence d'une ou de plusieurs CCP est non seulement susceptible d'avoir un impact direct sur le risque systémique par l'intermédiaire des bilans, mais la structure des CCP affecte le risque systémique d'une manière indirecte

à travers les mécanismes de prix. Variable endogène, les prix sont en partie fixés par les institutions financières. Ils s'imposent également à elles, par les valorisations de marché et limites en VaR (*value-at-risk*), deux éléments qui sont au cœur de la mécanique des contreparties centrales. Des effets de « second tour » par ce canal prix pourraient amplifier les mouvements de marché en temps de crise.

Marché des CDS et marché obligataire : lequel devance l'autre ?

VIRGINIE COUDERT ET MATHIEU GEX

Direction de la Stabilité financière, Banque de France

Nous analysons les liens existant entre CDS et obligations et nous tentons de déterminer quel marché joue le rôle moteur dans le processus de découverte du prix. Comme les tailles respectives des marchés sont sensiblement différentes selon qu'il s'agit d'emprunteurs souverains ou d'entreprises, nous examinons un échantillon de titres des deux catégories.

Pour chaque entité, nous comparons les primes des CDS et les *spreads* d'une obligation générique à 5 ans. Les résultats montrent que le marché des CDS devance celui des obligations privées. Ce rôle moteur du marché des CDS s'est accentué dans la crise actuelle. Cela vaut également pour les États, sauf pour les pays dont les titres ont un faible rendement.

Risque de concentration et nombre optimal de contreparties centrales pour un actif unique

FABIEN RENAULT

Direction des Systèmes de paiement et des Infrastructures de marché, Banque de France

Nous modélisons la compensation par contrepartie centrale d'un actif unique négocié de gré à gré par deux groupes de banques dans deux devises. Nous procédons à une comparaison des différents dispositifs de compensation faisant intervenir une ou deux CCP en fonction de leur capacité à faire face à une crise affectant à la fois les marchés et le système bancaire. En s'appuyant sur des exercices de simulation de crise, le modèle démontre combien il est complexe de déterminer un dispositif optimal de compensation. De nombreux paramètres rentrent effectivement en jeu, notamment la taille du fonds

de garantie de la/des CCP, le degré d'intégration entre les différents groupes de participants et leurs profils de risques. Dans l'ensemble, toutefois, une solution ne faisant intervenir qu'une seule CCP semblerait moins robuste qu'un dispositif impliquant deux CCP en cas de crise de grande ampleur, et à l'inverse, ne s'avère plus résiliente que lorsque la crise est de faible intensité. Il est également intéressant de constater que le dispositif à deux CCP donne également de meilleurs résultats que le dispositif à CCP unique pour un nombre peu élevé de participants.

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Direction de la Communication

Service Relations avec le public

48, rue Croix-des-Petits-Champs

75001 PARIS

Telephone: + 33 (0)1 42 92 39 08

Fax: + 33 (0)1 42 92 39 40

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