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COMMISSION STAFF WORKING PAPER

Accompanying the

COMMISSION COMMUNICATION

Ensuring efficient, safe and sound derivatives markets

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EXECUTIVE SUMMARY

The main findings of this Staff Working Paper are the following:

- Derivatives and complex products, negotiated mainly in over-the-counter (OTC) markets, have come to the forefront of the policy debate during the financial crisis. However, OTC derivative vary substantially among different market segments.
- In terms of market infrastructures, some market segments, such as interest rate derivatives and foreign exchange derivatives, are mature and have strong market infrastructures and risk management systems in place, even though the coverage of these systems should be expanded. Other segments, such as equity derivatives, are less mature and have less developed infrastructures in place.
- In terms of risk characteristics, the early focus on credit default swaps was justified in view of its binary and discontinuous pay-out structure, concentrated dealer market structure, difficulty of valuing the rights and obligations contained in the contract, especially for the less liquid single name part of the market, lack of solid risk management measures and disproportionate dimension of the derivative market with respect to the underlying market. Most other OTC derivatives appear less risky, as pay-out structures are more continuous in nature (e.g. interest rate swaps, foreign exchange derivatives, equity derivatives), the market more disperse (e.g. interest rate swaps, foreign exchange derivatives, equity derivatives, commodity derivatives), the underlying markets more liquid and the underlying risks more observable (e.g. foreign exchange, interest rate swaps, equity derivatives), risk management measures sometimes more solid (e.g. interest rate swaps, foreign exchange derivatives) and electronic systems more developed (e.g. credit default swaps, interest rate swaps).
- Even so, much can be done to strengthen these market segments so as to ensure financial stability. CCP clearing is the most effective way of reducing credit risk and is broadly feasible in all market segments. But, for CCP-eligible products, to increase the use of CCPs further in the EU, safe, sound and common requirements are necessary. Although CCP clearing can grow substantially to cover large parts of OTC derivatives, it cannot apply to all OTC derivatives as the necessary prerequisites are not always in place and not easily applicable. It is, therefore, also important to improve product and market standardisation, strengthen bilateral collateral management and ensuring central storage of contract details.
- In addition, the crisis and the role played by some OTC derivative market segments require a deeper discussion on how to reconcile the clear value played by OTC derivative markets – satisfying, as they do, the demand for flexible and bespoke derivative contracts to manage specific, non-standard risks – with an a priori societal preference for transparent trading venues, as public and standardised as possible for the purpose of risk assessment and price determination.

1. INTRODUCTION

The ongoing financial crisis has brought unprecedented regulatory attention to over-the-counter (OTC) derivatives markets and to the way in which credit risk has been transferred. Indeed, one of the root causes of the crisis may be traced back to the misuse of the techniques that were developed to transfer credit risk (securitisation and credit derivatives). While some of the problems related to securitisation and to the excessive risk transfer and risk mispricing have already been addressed by the recent review of the Capital Requirement Directive¹ (CRD), the risks inherent in Credit Default Swaps (CDS) and other types of OTC derivatives have not. Their use and their impact on financial stability generated the current political debate and are analysed in this report.

The near-collapse of Bear Sterns in March 2008, the default of Lehman Brothers on 15 September 2008 and the bail-out of AIG on 16 September highlighted the fact that OTC derivatives in general and credit derivatives in particular carry systemic implications for the financial market.

By their nature, OTC markets are markets for professional investors and are thus not directly accessible to the general public. As professional investors were deemed sophisticated enough to manage the risks inherent in the OTC market, the latter has been accorded fairly light regulatory treatment. However, the recent financial crisis has illustrated that professional investors not always understand the risks they face and the consequences of those.

The bilateral nature of this market makes it opaque to parties outside a particular transaction. In addition, the level of concentration in the market in terms of participants tends to be high². Moreover, as the price determined in the derivatives markets may be used to calculate the price of other instruments, its opaque nature may affect other market segments. In the credit default swaps (CDS) market, for example, the prices of these instruments have a direct impact on the financing costs a firm faces. Furthermore, even if not directly accessible to the general public, the instruments traded in the OTC market may ultimately affect retail investors through other products or via professional investors. Finally, as the major financial institutions tend to participate in most (if not all) the segments of this market, the level of interconnection (and hence the spill-over effects) between these various segments are extremely high³.

These characteristics proved to be the Achilles heel of the OTC market during the current crisis and might have, absent prompt and forceful intervention from governments, wrecked havoc to the financial system. The three institutions mentioned above were important players in the OTC derivatives market, either as dealers or users of OTC derivatives, or both⁴. Whilst the trouble they experienced originated outside the OTC derivatives markets and was initially

¹ COM/2008/0602 final - COD 2008/0191 amending Directives 2006/48/EC and 2006/49/EC as regards banks affiliated to central institutions, certain own funds items, large exposures, supervisory arrangements, and crisis management.

² Although it may vary significantly from one segment to another.

³ The same can also be said in terms of interconnectedness between OTC and regulated markets. In fact, it would appear that during this crisis the hit taken by regulated markets due to trouble on OTC markets was substantial (their liquidity was used by banks to sell instruments in order to either obtain collateral or cover the losses in the OTC markets).

⁴ So much so that two of them were bailed out by the US government in fear of systemic repercussions in case of their default. The third one (Lehman), while not recognised as such before its default, proved to be systemically important as well.

confined to a small segment of the OTC market (i.e. credit derivatives)⁵, their crucial role in virtually all the segments of the OTC derivative market (in the case of Lehman and Bear Stearns) had a negative spill-over effect for the entire OTC market. The opacity of the market prevented, on the one hand, other market participants from knowing exactly what the exposures of their counterparties were to these three entities (the events in the credit default swaps market after Lehman's bankruptcy are a point in case), which resulted in mistrust and the drying up of liquidity in the inter-bank money market. It also prevented regulators from being able to identify early the risks building up in the system, the extent to which risks were being concentrated in a handful of institutions and consequently the effects that their default would have for financial stability. The light regulatory coverage of the market exacerbated this problem as supervisors did not have sufficient information. Even in case they had sufficient information, one could, argue that the lack of proper regulatory coverage might have deprived public authorities of an effective policy response.

Whilst the current crisis brought an unprecedented amount of scrutiny on the OTC market, this does not mean that no regulatory attention was directed towards this market. For example, the Committee on Payment and Settlement Systems (CPSS) published a report on the risks inherent in OTC derivatives markets and the tools used by the industry to mitigate them already in 1998⁶. Also, in the past few years, regulatory attention had been increasingly focused on decreasing the risks inherent in the OTC market. For example, the adoption of the Financial Collateral Arrangements Directive (FCD) contributed significantly to improvement of collateral treatment in the OTC derivative markets by granting protection of the collateral provided and for netting and close-out netting agreements.

Furthermore, actions have been taken by public authorities in order to increase the safety of OTC derivatives markets by improving their operational efficiency. Although necessary, the crisis has amply illustrated that these latter efforts are by themselves insufficient and that more needs to be done to ensure that OTC derivative markets do not pose a threat to the financial system. Supervisors, regulators and policymakers around the world have started to notably focus on strengthening the vital risk management function of central counterparty (CCP) clearing.

On 17 October 2008, Commissioner McCreevy called for i) a systematic look at derivatives markets in the aftermath of the lessons learned from the financial crisis, and ii) concrete proposals as to how the risks from credit derivatives can be mitigated.⁷ On 2 December 2008 the Council supported, as a first step and as a matter of urgency, the creation of one or more European CCP clearing capacities in OTC derivatives markets, and encouraged coherence with parallel initiatives at global level.⁸ On 18 December 2008 the ECB's Governing Council confirmed that *"there was a need for at least one European CCP for credit derivatives and that, given the potential systemic importance of securities clearing and settlement systems, this infrastructure should be located within the euro area"*.⁹ Finally, on 2 April 2009 the G20 declaration on strengthening the financial system promoted the standardisation and resilience

⁵ The downfall of all three institutions was due to their direct or indirect exposure to the sub-prime mortgages market. In the case of Bear Stearns and Lehman Brothers, their exposure was through collateralised debt obligations (CDOs) backed by sub-prime mortgages they held on their books. In case of AIG, the exposure was through CDS that the latter had sold on those CDOs.

⁶ CPSS (1998). A follow-up report was published in 2007.

⁷ McCreevy, C. (2008).

⁸ Economic and Financial Affairs Council (2008).

⁹ ECB (2008).

of credit derivatives markets, in particular through the establishment of central clearing counterparties subject to effective regulation and supervision.¹⁰

To ensure a solid, coherent and consistent policy response, the Commission in its Communication of 4 March¹¹ committed to deliver, on the basis of a report on derivatives and other complex structured products, appropriate initiatives to increase transparency and to address any financial stability concerns. The Communication¹², this Staff Working Paper and the Consultation Document¹³ that outlines the options contained in the communication in further detail and accompanies them with questions are a first response to that commitment. As outlined in the Communication, this will feed into a detailed impact assessment exercise, which will help the Commission to shape its approach.¹⁴

This report is structured as follows. Chapter 2 outlines how derivative contracts work and the role they have played during the financial crisis. Chapter 3 focuses on OTC derivatives and assesses the (i) market structure, (ii) market infrastructure, (iii) level of standardisation, (iv) risk characteristics and (v) risk mitigation instruments currently used (with a particular emphasis on multilateral CCP clearing vs. bilateral clearing by means of collateral). The assessment is done for the main OTC derivative asset classes: interest rate derivatives, credit derivatives, foreign exchange derivatives, equity derivatives and commodity derivatives. Chapter 4 detailed the level of risk associated with each OTC derivatives market segment and the level of effectiveness of current risk mitigation measures.

2. DERIVATIVES MARKETS: FUNCTION, STRUCTURE AND RISKS

This chapter outlines the basic concepts related to the function of derivatives, the overall market structure, the level of transparency in the market, the major risks entailed and existing ways of mitigating these risks.

2.1. Function of derivatives

2.1.1. What are derivatives

Derivatives are financial instruments whose value is derived from the value of an underlying asset or market variable. The main types of derivatives are: forwards, futures, options and swaps.

¹⁰ G20 (2009).

¹¹ European Commission (2009a).

¹² European Commission (2009b).

¹³ European Commission (2009c).

¹⁴ This is consistent with recent amendments to the Capital Requirement Directive (CRD), as adopted in first reading by the European Parliament on 6 May 2006. Recital (19b) states: "In order to ensure financial stability, the Commission should review and report on measures to enhance transparency of OTC markets, to mitigate the counterparty risks and more generally to reduce the overall risks, such by clearing of credit default swaps through central counterparties. The establishment and development of CCPs in the EU subject to high operational and prudential standards and effective supervision should be encouraged. The Commission should submit its report to the European Parliament and the Council together with any appropriate proposals, taking into account of parallel initiatives at the global level as appropriate." and,

Article 156 (review clause) states: "By 31 December 2009 the Commission shall review and report on measures to enhance transparency of OTC markets, including the credit-default swap (CDS) markets, such as by clearing through central counterparties (CCPs), and shall submit this report to the European Parliament and the Council together with any appropriate proposals."

A forward is a contract whereby two parties agree to exchange the underlying asset at a pre-determined point in time in the future at fixed price. Therefore, the buyer agrees today to buy a certain asset in the future and the seller agrees to deliver that asset at that point in time. Futures are standardised forwards traded on-exchange.

An option is a contract that gives the buyer the right, but not the obligation, to buy (call) or sell (put) the underlying asset at or within a certain point in time in the futures at a pre-determined price (strike price) against the payment of a premium, which represent the maximum loss for the buyer of an option. Therefore, differently from forwards and futures, options settle only if exercised and will be exercised only if in-the-money, i.e. if the strike price is lower/higher than the current market price for a call/put.

Under a swap agreement two counterparties agree to exchange one stream of cash flow against another on a notional principal amount. The different types of swaps agreements are explained in chapter 3.

2.1.2. The use of derivatives

Broadly, derivatives can be used for hedging, speculating and arbitrage purposes. With a hedge, an investor can protect himself against risk he is exposed to. Risk that can be hedged with derivatives can be movements in market variables (e.g. exchange and interest rate, share and commodity prices) as well as credit risk.

Derivatives can also be used to speculate on the movement of a market variable or on creditworthiness. Speculators add liquidity to the market by taking a view on the direction of the movement; what is often called as taking a bet, can of course be called taking risk. Since there are two parties to a derivative deal, a speculator needs to find someone who holds the opposite view or would like to transfer a particular risk.

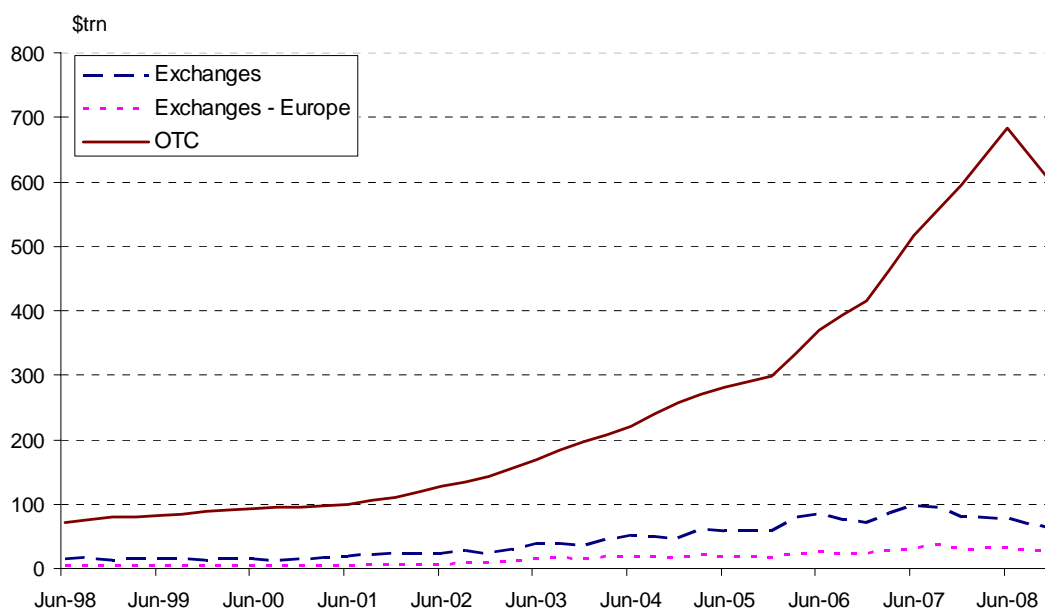
Finally, derivatives can be used for arbitrage. An arbitrage opportunity is the exploitation of price differences between markets. Derivatives can be combined to replicate other financial instruments, thus they can be used to "connect" markets by eliminating pricing inefficiencies between them.

Derivatives thus play a fundamental role in price discovery. For example, they provide the market's view on future developments in market variables. They may also provide a view on the default risk of a reference entity, on a company or a sovereign borrower, or of a particular segment of the credit market. Thereby, derivatives allow for pricing of risk that might otherwise be difficult to price because the underlying assets are not sufficiently traded.

2.2. Market structure

Derivative contracts can either be traded in a public venue, i.e. a derivatives exchange, or privately over-the-counter (OTC), i.e. off-exchange. OTC derivatives markets have been characterised by flexibility and tailor-made products. This satisfies the demand for bespoke contracts tailored to the specific risks that a user wants to hedge. Exchange-traded derivative contracts, on the other hand, are by definition standardised contracts.

Chart 1: The size of derivatives markets: on- and off-exchange



Note: The figure shows the notional amounts outstanding in on- vs. off-exchange market segments in USD trillions in 1998-2008. The trends shows outstanding amounts worldwide, where European exchanges' market share is shown separately (no similar geographic breakdown exists in OTC data). Source: Bank for International Settlements (BIS).

While derivatives were initially mostly traded in public venues, today the bulk of derivatives contracts is traded OTC (roughly 85% of the market in terms of notional amounts outstanding). The OTC market has expanded quickly in recent years, but decreased in 2008 for the first time since monitoring started in 1998.

Whether a derivative contract is standardised or bespoke determines how the market has structured the delivery of trade and post-trade chain functions:

- **Trade execution:** Trade execution occurs when two counterparties agree to a transaction. On-exchange, orders are matched automatically on derivative exchanges' order books. OTC execution may take a variety of forms, depending on contracts' standardisation and market preference, e.g. occurring by phone or electronically on "private" exchanges (e.g. inter-dealer networks). Electronic trading has increased rapidly in recent years, driven in part by the advent of hedge funds, which have different trading needs compared to e.g. corporates.
- **Trade confirmation:** After the execution, the terms of the trade need to be verified (affirmation) and confirmed. On-exchange, this occurs automatically within the exchange's matching system. As regards OTC, the most standardised (vanilla) OTC contracts use electronic affirmation and confirmation third-party services (e.g. Markit Wire, DTCC's Deriv/SERV etc).
- **Clearing:** Contrary to equity markets, where the post-trade aspects (e.g. exchange of cash and transfer of ownership) are completed quickly (less than 2/3 days), derivative contracts involve long-term exposure, as derivative contracts may last for several years. This leads to the build-up of huge claims between counterparties, with of course the risk of a counterparty defaulting. Clearing is the function by which these risks are managed over time. On-exchange, clearing is done on a Central Counter-party (CCP). OTC, clearing is mostly done bilaterally between the parties involved but increasingly on a CCP. In view of

the key role of risk in derivative markets, the issue of clearing and risk management more widely are treated more in depth in section 4.

Dealers play an important role in OTC derivative markets, acting both as prime brokers (counterparty risk taker and leverage provision) and market maker (product structuring and liquidity provision). To be an effective dealer requires scale and reach. Accordingly, there are strong forces pushing for a centralised dealer structure. The crisis has somewhat altered the balance between dealers though, with clients becoming reluctant to use only one prime broker, instead preferring to split business among a few prime brokers.

2.3. Transparency

While exchange-traded derivatives leave a transparent trail in terms of positions, prices and exposures, in the mostly OTC market for derivatives, information available to market participants and supervisors is limited. In the preceding sections, it has been emphasised that neither market participants nor supervisors had a complete view of the market. More transparency to regulators, mainly on positions, might improve the resilience of the financial system. The situation is described in the first part of this section. In addition, transparency might also improve market efficiency (in particular through price transparency) helping detecting possible market abuses (through transaction reporting) and reducing frictional costs in the market. These latter aspects are dealt with in the second and third part of this section.

2.3.1. Transparency on positions

The main providers of market survey data are the Bank for International Settlements (BIS), International Swaps and Derivatives Association (ISDA) and the British Bankers Association (BBA), covering the broad categories of derivatives. The US Comptroller of the Currency (OCC) quarterly publishes data from US commercial banks received through regular reporting. Some service providers in the derivative market, for example clearinghouses or electronic trade confirmation platforms, also collect information. For CDS, the DTCC Trade Information Warehouse (TIW)¹⁵, began publishing aggregated data in autumn 2008 (see section 3.1.5).

However, each of the abovementioned sources provides only a partial picture of the market. Only the OCC provides positions of particular a group of institutions (commercial banks), which are aggregated by types of derivative instruments (e.g. CDS, interest rate swaps etc.). Similarly, the TIW breaks down the data on CDS by reference entity, but does not provide data on exposures of single institutions. Publicly available information, on which the market could form a view on possible counterparty risk correlations, is therefore incomplete.

Information on positions that supervisors receive from financial institutions is more complete, as long as the financial institutions are located within their respective jurisdiction. However, since derivative trading is global, supervisors may currently be unable to get a complete picture of counterparty exposures of a particular institution in a timely fashion. In addition, they may also be unable to identify the level of concentration of holdings of a particular instrument. Their access to private service providers, such as the TIW, but also to portfolio reconciliation services (those offered by e.g. Markit and TriOptima, see section 2.4.1.3) is currently on a case-by-case basis. CCPs naturally collect position data in their respective market on at least a daily basis, which is provided to the primary regulator. Currently, little data is provided to the public apart from the total open interest in the CCP.

¹⁵ The DTCC is the Deposit Trust and Clearing Corporation, which is the US Central Securities Depository and Clearing House for equities and bonds.

However, the Federal Reserve Bank of New York has recently established a group of supervisors to detail their information needs in the CDS market, in order to define consistent reporting obligation for CCPs and for central data repositories.

2.3.2. *Transparency on prices*

Prices (bid-ask spreads) are generally available to OTC market participants via interdealer brokers or from dealers to clients in response to request for quotes. Data vendors also distribute consensus prices¹⁶ on the basis of the information provided by their contributors. Post-trade transparency on traded prices is limited. As mentioned above, the prices determined in the derivatives market are particularly relevant as a reference price for the particular risk traded. For example, the CDS price, as an indicator for default risk, affects the refinancing cost faced by firms. In this context, wider availability of post-trade information has been raised several times.

On a public trading venue, where standardised products are traded, information on prices is fully transparent to both public and regulators. As proved by the Markets in Financial Instruments Directive (MiFID) for equities, a level playing field between trading venues is established if they are all subject to appropriate transparency requirements.

Extensive analysis and consultation has been carried out in recent years on whether more transparency of trading activity also in non-equity markets is required. There are valid arguments both in favour and against. While market participants, infrastructure providers and regulators tend to agree that an adequate picture of ongoing and past trading activity is necessary, they disagree on the adequacy of existing arrangements and the need for regulatory intervention.

On the one hand, in conditions of disproportionate disclosure requirements in less liquid markets, dealers would be discouraged from committing capital to trading, and the benefits of the relevant financial instruments would be foregone. On the other, some participants could benefit from more transparency in order to reduce the information asymmetry in favour of the major dealers. With the crisis, this opacity in OTC derivative markets has become a major concern for regulators and market participants. CESR is currently revising the level of price transparency available in structured finance products and credit derivatives market.

2.3.3. *Transaction reporting*

Transaction reporting to supervisors has the primary purpose of preserving market integrity. Article 25(3) of MiFID requires investment firms to report all transactions in any financial instruments admitted to trading on a regulated market to the competent authority (including exchange-traded derivatives and listed structured products), wherever these transactions take place (regulated market, multi-lateral trading facility (MTF) or OTC). This means that transactions in OTC derivatives and other complex products if these are not admitted to trading on a regulated market are exempt from these requirements.

CESR has recently mandated a Task Force to analyse the possibility to both collect and exchange reports in some OTC derivatives with the objective to help detect cases of market abuse. As these OTC financial instruments which are not listed mirror instruments admitted to trading on regulated markets they can equally be used for market abuse.

¹⁶ Consensus prices are average of the price at which a contributing dealer is willing to trade or have traded a particular contract, without differentiation between the two.

Based on the preliminary analysis carried out¹⁷, there may be a need to extend the scope of Article 25 to include OTC derivative instruments whose underlying financial instrument is admitted to trading on a regulated market (including corresponding depositary receipts). Although Recital 45 of MiFID allows Member States to apply transaction reporting obligations to financial instruments that are not admitted to trading on a regulated market, the collection of transaction reports of OTC derivative instruments is currently not mandatory. Most Member States appear to support changing this.

2.4. Risk and risk mitigation

Derivative contracts bind counterparties together for the duration of the contract. The duration varies depending on product type and market segment, ranging from e.g. a few days sometimes in FX derivatives to several decades for certain interest rate derivative contracts.

Throughout the duration, counterparties build up claims against each other, as the rights and obligations contained in the contract evolve with the underlying that the contract is derived from. This gives rise to counterparty credit risk, i.e. the risk that the counterparty may not honor its obligations under the contract. As outlined above, it is difficult to value this risk in view of the opaque nature of OTC derivatives markets.

Clearing is the function by which this risk is managed. Clearing can either occur at bilateral level between the two counterparties to a particular trade or at multilateral level, by means of a Central Counter-party (CCP) becoming the counterparty to all other counterparties.

2.4.1. Bilateral clearing

Under bilateral clearing, the two counterparties typically conduct their trading relations under a Master Confirmation Agreement (MCA) that sets the main contractual parameters governing their trading relationship. This agreement may have a Credit Support Annex (CSA) that outlines how the two counterparties agree to manage their respective credit exposures to each other. The CSA applies to all OTC derivatives transactions concluded between the parties to the CSA.

2.4.1.1. Principles of bilateral collateral provisioning

The underlying principle is that both parties will mark-to-market (MTM) contracts so as to monitor the evolution of their residual value.

Should the MTM process show that one party has built up a claim on the counterpart it is then entitled to ask its counterparty for collateral in order to mitigate the risk that the counterparty may not eventually honor its obligation or may default during the lifetime of the contract.

Collateral is typically provided in cash (see below). Cash is exchanged on a net basis, i.e. a single net cash value is calculated for the overall OTC derivative portfolio between the two counterparties in question. Each counterparty therefore benefits from cross-margining (i.e. build-up of claims in one derivative market segment compensated by build-up of liabilities in another). Other types of collateral include securities, letters of credit, guarantees and commodities.

¹⁷ Call for Evidence on the Technical Standards to Identify and Classify OTC Derivative Instruments for TREM, CESR's Transaction Reporting Exchange Mechanism, 2 February 2009

2.4.1.2. Practice of bilateral collateral provisioning

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.

ISDA's "Margin Survey 2009" documents that in 2008, reported collateral amounted to \$2.6 trillion. As the survey is based on reports from a sub-set of market participants, ISDA estimates that the overall amount of collateral in circulation amounted to \$4 trillion. ISDA further documents that 151,000 collateral agreements were in place. Of these, the large majority (57%) are concluded under New York law, while around 28% are concluded under English law.

According to ISDA, the use of collateral has grown over the years. The corresponding figures for 2000, the first year a survey was carried out, estimated the amount of collateral at \$200bn and documented 12,000 collateral agreements.

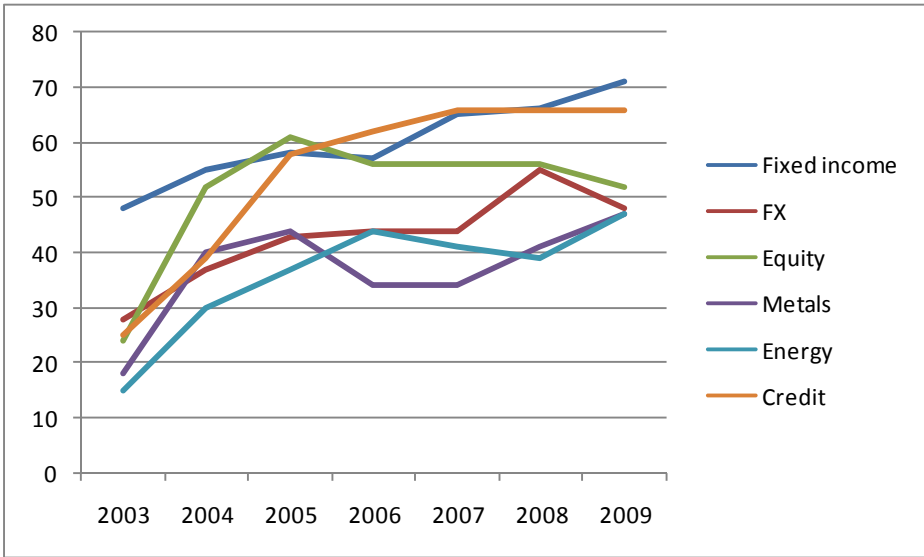
ISDA argues that the amount of credit exposure that is covered by collateral has grown, as documented by the graph below and it claims that it now amounts to 66% overall. Above average is fixed income (71%), on average is credit and below average are commodities (47%), FX (48) and equity (52).

It is interesting to note that for CDS, the asset class that has been subject to the brunt of regulatory attention, the level of collateral, as share of credit exposure, has remained flat since 2006. This may indicate that while absolute amounts of collateral may have increased substantially, the credit exposure has increased even more.

Cash is the dominant source of collateral, amounting to 84% of collateral received in 2008 and 83% of collateral delivered. Government securities are the second source of collateral (9 and 15% respectively). Other sources are e.g. corporate bonds, letters of credit and commodities.

Chart 2: Credit exposure covered by collateral, 2003-2009

Percent of exposure, full sample



Source: ISDA (2009)

2.4.1.3. Portfolio reconciliation

Collateral is based on firms' internal trade documentation and mark-to-market estimates. These may be more or less solid. Overall, managing collateral with a wide variety of counterparties may be challenging. To assist firms in their collateral management processes, third party vendors provide reconciliation services (e.g. TriOptima).

Portfolio reconciliation facilitates the bilateral collateral management process. In 2008 all major dealers have started to reconcile all OTC derivatives between themselves and major counterparties, most on a daily basis. Reconciliation covers the whole portfolio: trade population, key financial terms (e.g. notional, bought or sold...) and mark-to-market value (i.e. a counterparty's effective measure of risk of a particular contract). If disputes arise, reconciliation provides processes for resolving them. Overall, it allows counterparties to monitor credit exposure more effectively. ISDA's survey found that while a large share of survey respondents use reconciliation services (80%), only some reconcile on a daily basis while some only do it in case of disputes.

Table 1: Current use of portfolio reconciliation services

Use/timing	Share (%)
Use reconciliation services	80
• Reconcile daily	31
• Reconcile weekly	6
• Reconcile monthly	4
• As needed	20

Source: ISDA (2009).

2.4.1.4. Potential weakness of bilateral clearing

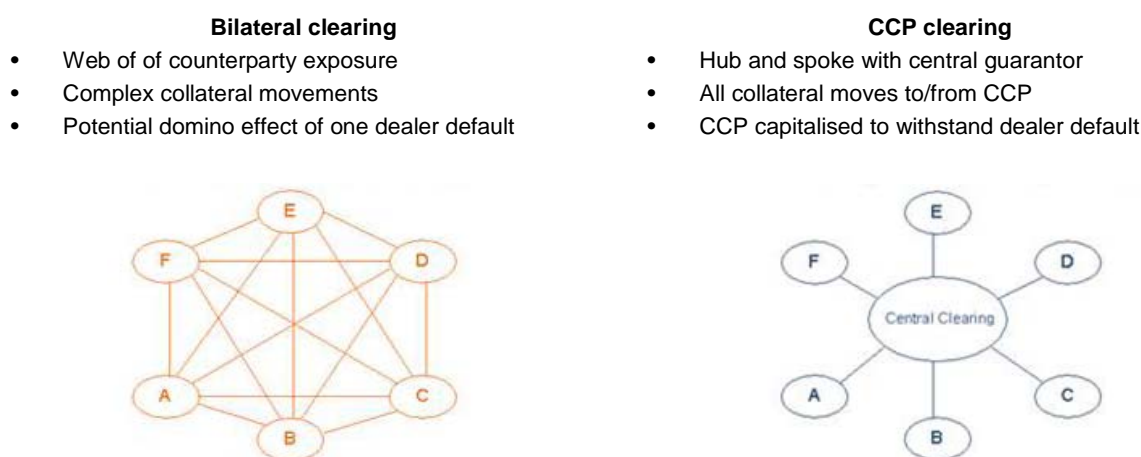
Overall, collateral is only an effective insurance against credit exposure if (i) exposure is calculated frequently, (ii) collateral is effectively exchanged in a timely manner and (iii) it offers a comprehensive insurance against overall potential counterparty credit exposure. Bilateral clearing, while essential, is associated with a number of potential weaknesses in all these respects:

- First, bilateral clearing fundamentally relies on each party's internal 'risk engine', i.e. approach to and method for assessing the current value of and risk associated with the constituent components of its OTC derivatives portfolio. These risk engines are essential parts of a bank's competitive advantage and while the broad contours may be similar each bank has a slightly different approach to risk assessment. Overall, the crisis has highlighted the difficulty of designing models that adequately measure the market risk.¹⁸ It is therefore not unlikely that disputes may arise between counterparties as regards the MTM value associated with a particular contract and the corresponding collateral obligation it gives rise to. This risk is further amplified by the fact that the CSA does not detail the risk valuation method to be employed between the parties in any significant detail. Disputes therefore do arise, particularly over differences in parameters (e.g. frequency of MTM, curve calculations...) and these take time to resolve. Portfolio reconciliation is useful in this respect, as it makes potential differences in MTM values transparent and may as well offer ways of facilitating the resolution of disputes.
- Second, while the ambition is for the collateral cycle to mirror the valuation cycle, practice differs. While daily valuation and (close-to-daily) exchange of collateral is the norm for the major market making dealers, the frequency falls substantially as one moves down to second and third tier institutions. Weekly and even monthly valuation and exchange of collateral continues to be an existing market practice.

¹⁸ See e.g. The High-level Group on Financial Supervision chaired by Jacques de Larosière (2009).

- Third, collateral is generally based on mark-to-market values only. It does not incorporate the potential cost of replacing the contract in the market should the original counterparty default (i.e. the future replacement cost).
- Fourth, the level of collateral that is effectively provided often also takes into account the perceived credit quality of the counterparty. The source for assessing that quality is credit ratings. Typically, if the counterparty has a high credit rating, effective collateral levels may be reduced. The crisis has amply illustrated the deficiency of ratings and the negative effects this has on the bilateral collateral model has been illustrated by AIG. Credit default swaps issued by AIG Financial Products were for long exempt from providing full levels of collateral, thanks to (i) the parent company AIG's high rating, and (ii) the fact that AIG only sold CDS on "super-senior" security tranches. However, as the financial crisis took off in 2007, AIG and the super-senior CDS were gradually downgraded, which triggered significant collateral calls that AIG found it increasingly hard to meet.
- Fifth, as illustrated above, collateral coverage is not comprehensive. While collateral now covers 66% of credit exposure overall, more than one third of credit exposures remain uncollateralised. While the overall rate of exposure covered by collateral is significantly higher compared to a decade ago, the universal upward trend has been broken in recent years, with growth in effective coverage having stalled (CDS) if not reversed (equity, FX). Moreover, the collateral numbers reported by ISDA are simple averages based on respondents' average figures.¹⁹
- Sixth, and more broadly, bilateral clearing as well as the overall risk management approach set by each institution is vulnerable to competing intra-institutional considerations, such as the quest to maximize commercial opportunities and associated profits. The crisis has highlighted the difficulty for institutions to uphold a conservative approach to risk in a competitive market environment. This differs from multilateral clearing, where the risk management function is carried out by a CCP, i.e. an institution whose sole focus is risk reduction.

Chart 3: Bilateral vs. CCP clearing



¹⁹ In other words, they are not weighted by the size of the respondent institution. It is accordingly difficult to assess whether the overall figures are representative, as the figures reported by a second tier institution weigh as much as those of a major market making dealer. Intuitively, larger institutions should find it easier to manage the collateral process. Informal numbers do indeed suggest that some of the larger institutions have collateral in excess of the survey figures reported by ISDA.

- Finally, bilateral clearing requires management of numerous clearing relationships (with all counterparties), necessitating investments in systems and man-power. The very nature of the complex bilateral network this gives rise to makes it difficult, if not impossible for an institution to understand its own credit exposure in view of its counterparties' exposure to each-other let alone assessing the cascading implications of the default of a counterparty.

2.4.2. CCP clearing

Moving from bilateral to central clearing by using one or several CCPs is the most immediate way of addressing the limitations outlined in the previous section. CCP clearing is associated with significant benefits, but requires a certain number of market characteristics for it to work.

With central clearing, trading partners remain to be found on a bilateral basis. However, a central counterparty (CCP) changes the terms of trade in two ways: First, it allows netting of exposures in a multilateral way, namely with all participants in the CCP (which is organised by asset class). Second, it is a mutual insurance against default of one of the participants.

After two parties have agreed on a trade, the CCP steps into each trade by acting as a counterparty to each side (the trade is "novated"). The obligations of each of the two trading partners are now vis-à-vis the CCP, hence each party's exposure in this market is now with one and the same party, which can net them out. Moreover, the CCP can value each trade and hence exposure on a daily basis.

There is often a debate on whether it is better to have one or more CCPs in any given market. There are reasons on both sides. Economic theory argues that from the point of view of efficiency a single CCP is optimal (though only in the short run). However, from a safety and competition point of view a market structure with more than one CCP is preferable.

2.4.2.1. Benefits of CCP clearing

As explained above, in bilateral OTC trades, parties post collateral to each other in order to reassure themselves (partly) that the counterparty will honour the contract. This may happen at the inception of the contract ("initial margin") as well as during its lifetime ("variation margin"). In a CCP, both types of collateral are posted centrally. This has two benefits. First, since exposure is in net terms, i.e. of each party against the CCP, collateral is also netted multilaterally. Second, by collecting collateral centrally, the amount of collateral available in case of a default among the participants is quite large. In addition, to be allowed for trading on a CCP platform, an upfront deposit has to be made ("default fund"). This provides additional protection in case of a default. Thus, by collecting collateral centrally and by asking for the upfront deposit, a CCP is well-insured against default – as are the trades to which it has become a party. Since posting collateral means economically a (partial) funding of a trade even in a bilateral OTC transaction, the pooling of collateral in a CCP implies that each trade becomes well funded. By the same token, in case of a default of one participant, recourse is made to that pool of collateral, which mutualises the cost of default. It is this mutual pre-funding of risk that prevents cascades of counterparty defaults.

The CCP can make adjustments rapidly when the risk position in that market changes. This is in contrast to bilateral relationships, where only the risk position of direct trading partners can be observed by market participants and thus an overall change of exposure on a particular asset class may go unnoticed for a long while.

In view of this, the advantages of using a CCP can be grouped as follows:²⁰

- First, it allows risk mitigation and mutualisation of losses. This is a fundamental qualitative difference with bilateral collateral provisioning. Risk mitigation is guaranteed by multilateral netting, by novation (i.e. the process through which the original bilateral contract is replaced by two contracts between the CCPs) and by robust margining procedures and other risk management controls that render the CCP the most creditworthy counterparty. Margins are effective, initial margins are always calculated irrespectively of the counterparty of the trade, future replacement cost is duly taken into account and exposures are generally fully collateralised on a daily basis. Furthermore, a CCP is better placed than single counterparties of a bilateral transaction to absorb the failure of a member. Through the design of clearing members' margining and collateral requirements, CCPs reduce the probability of immediate propagation to solvent members of the losses incurred by the insolvent one. In addition, the CCPs ability to mutualise losses enables it absorb defaults far better than any individual participant in bilateral clearing.
- Second, it has a positive effect on market liquidity. Provided that the CCP clears a sufficient number of asset classes, the usage of a CCP for OTC derivatives may allow a member to free capital for other purposes, as less collateral should be required, thanks to multilateral netting, payment netting and possible cross-margining arrangements with exchange-traded contracts, all resulting in increase of liquidity.
- Third, it solves disruptive information problems. 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.
- Fourth, using a CCP increases operational efficiency. As the counterparty of all trades a CCP establishes the margin and collateral requirements for all the participants, centralises the necessary calculations, mark-to-market open contracts and collect or pay the respective amounts in automated ways, reducing disputes and increasing efficiency.
- Finally, it allows regulatory capital savings since it is considered a zero risk counterparty.

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 (e.g. LCH.Clearnet's successful unwinding of the interest rate swap positions left open following the default of Lehman Brothers, as further documented in chapter 3.2).

2.4.2.2. Costs and savings related to CCPs

Traditionally, firms carry out cost-benefit analysis on whether or not to use CCP clearing in any given OTC derivative asset class. Firms' potential savings from using CCP can largely be summarised into two sources:

- **Economic capital savings:** compared to bilateral clearing, multilateral clearing offers significant additional netting benefits. Furthermore, under the Basel II Capital Adequacy

²⁰ Bliss, R. and C. Papathanassiou (2006)

framework, a zero risk weighting is attributed to counterparty credit risk exposures on derivatives contracts that are outstanding with a CCP, provided that the CCP fully collateralises its exposures with all participants on a daily basis²¹.

- **Operational savings:** due to centralised collateral management. More efficient centralised processes reduce the operational risks and the costs associated with them.

The costs involved in using a CCP primarily relate to the contribution to the CCP's various safeguards (i.e. initial margin, variation margin, default fund) and to a lesser extent the need to invest in infrastructure connecting to the CCP. Moreover, a CCP improves transparency, which redistributes informational advantages among market participants, to the disadvantage of those currently enjoying an information advantage (i.e. major OTC derivatives dealers).

Traditionally, market participants have valued the CCP proposition where (i) they trade in large notional size, (ii) the market is volatile, and (iii) the products sufficiently standardised.

2.4.2.3. Prerequisites for CCP clearing

There are a number of prerequisites for CCP clearing to be used, broadly related to liquidity, trade process standardisation and contractual standardisation. More specifically:

- The trade flow throughout the trading and post-trading chain should be sufficiently standardised to allow a CCP to step in after a transaction is concluded. Electronic trade confirmation largely facilitates this process.
- The price discovery venues need to be transparent and robust so as to facilitate risk valuation in e.g. mark-to-market processes.
- Broad fungibility so as to enable novation and netting. This requires minimum levels of industry-wide standardisation of main legal parameters contained in contracts (e.g. ISDA). But the level of required standardisation may vary, as illustrated by interest rate swaps and credit default swaps. The former are relatively standardised as regards contract definition, but remain highly bespoke in some of the main parameters (e.g. rates covered, tenor, etc). This tailor-made nature has not precluded CCP clearing, as the continuous risk profile of the instrument allows clearing of contracts with different terms. CDS, on the other hand, needed a standardisation in the contract terms to facilitate CCP clearing and, as outlined in section 3.1.4, new contractual and market conventions have been put in place. For other market segments, e.g. equity derivatives, even the contractual documentation is not yet standardised. Therefore, substantial work needs to be done before such markets are amenable to a broad uptake of CCP clearing.

2.4.2.4. CCP market structure

There are several factors to take in to account when considering whether clearing should be channelled through a single CCP or through multiple CCPs:²²

- (1) **Efficiency.** The CCP clearing function is characterised by economies of scale and scope. Hence, a single CCP may make economic sense in terms of static gains (i.e. reducing costs).²³ However, in terms of dynamic gains (i.e. innovation), the results may be more complicated. In particular, it is unclear how a single CCP will over time

²¹ Annex III, part 2, point 6 Directive 2006/48/EC

²² Hrovatin S. *et al* (2009).

²³ Duffie, D. and H. Zhu (2009).

manage to overcome the difficulty of creating benign conditions for innovation in the absence of competition, a common problem in monopolistic markets.

- (2) *Regulatory, supervisory and monetary policy related issues.* All of these provide powerful arguments against the global market being served by a single CCP located in a single non-EU jurisdiction, no matter how efficient that outcome would be in strictly economic terms. These concerns become particularly relevant in a crisis situation as the single CCP would be the single point of failure, putting all market participants at risk. In the absence of an effective crisis management mechanism relevant authorities do not know how the burden of a potential CCP default would be shared. Other concerns relate to i) the legal risks associated with such a crisis situation and the potential difficulty in accessing assets, and ii) liquidity problems affecting a particular currency of a different jurisdiction than that of the CCP.
- (3) *Stability.* A CCP does not eliminate counterparty risk. Rather, it creates a more transparent way of assessing that risk and a more effective way of managing it. CCPs are thus critically important institutions for systemic stability in their own right. As a consequence, the efficiency argument in favour of centralised CCP clearing market structure has to be squared against the stability argument which favours a more fragmented and reliable structure.
- (4) *Cross Margining and Interoperability.* Finally, there are ways of achieving the best of fragmentation and centralisation. Issues such as cross-margining agreements and interoperability should be contemplated, so as to improve the efficiency of clearing members' capital management.

Therefore, as highlighted by the G20 and de Larosière reports, it is desirable to have more than one CCP in order to ensure competition.

2.4.3. *Portfolio compression*

Portfolio compression reduces the amount of overall trades and notional size of the market by eliminating off-setting trades. This offers significant benefits for market participants. In OTC derivatives, participants build up gross positions that far exceed their net risk position. Portfolio compression typically (i) reduces counterparty credit risk without changing the net market exposure of an institution, (ii) reduce operational risks and costs, (iii) reduce administrative costs and (iv) overall cost of capital.

Portfolio compression also offer benefits in a CCP environment, as it can also be used to compress the CCP's portfolio. This facilitates default management: the smaller and less complex the defaulted party's portfolio, the easier and faster it is to manage the consequences of a participant's default.

In principle, portfolio compression can be applied to all OTC derivatives with sufficient liquidity to motivate netting down of gross positions. In practice, it is predominantly used in interest rate, credit default swaps and to some extent energy swap markets. Overall, the scope depends on the level of standardisation: the more standardised the contract, the easier it is to match eligible trades and tear them up. In terms of institutional scope, it is more logical for market-making institutions sitting on two-way flow rather than buy-side, which are either typically long or short.

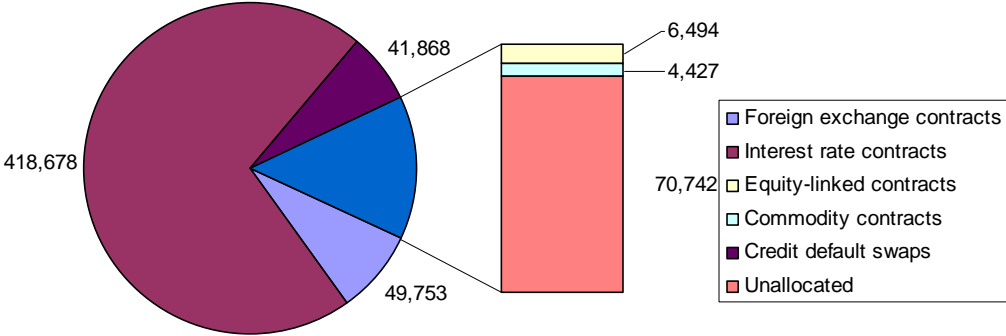
3. DIFFERENT TYPES OF OTC DERIVATIVES: RISK CHARACTERISTICS AND CURRENT RISK MANAGEMENT MEASURES

OTC derivatives are generally divided into five categories: credit derivatives, interest rate derivatives, foreign exchange derivatives, equity derivatives and commodity derivatives. The graph below depicts the relative weight of these market segments in the OTC market. Most of the market segments are also traded on-exchange (e.g. equity and commodity derivatives).

This chapter provides a detailed description of the market structure of each of these market segments. Each section outlines the specific function provided by derivatives in this market segment, the market structure, the infrastructure and level of standardisation in place or under development, the specific risk characteristics and existing risk mitigation instruments. The final section contains an overall assessment of the effectiveness of existing risk mitigation measures.

Chart 4: OTC derivative market segments

Notional amounts outstanding, USD trillion, December 2008



Source: BIS (2009)

Table 2: Overall market structure and infrastructure of different OTC derivative segments

Market	Trading	Products	Trade execution	Trade confirmation	Clearing/ settlement
Credit	OTC	CDS	Interdealer: Creditex, ICAP... Dealer to client: MAX	DTCC Deriv/Serv Markit Wire T-Zero	ICE Trust US BClear
Rates	Exchange	Futures on short term interest rates and government bonds	Eurex, Liffe, CME	Exchange trading matching systems	Eurex Clearing, Liffe Clear, CME Clearing
	OTC	IRS	Interdealer: ICAP, Tullet Dealer-client: TradeWeb, BBG	Markit Wire Trade Express	SwapClear
FX	Exchange	Futures and options	CME	Exchange trading matching systems	CME Clearing
	OTC	Spots and options	Interdealer: EBS, TFS-ICAP, Reuters Dealer-client: FXAll	Swift CLS	CLS
Commodities	Exchange	Futures	CME, Liffe, ICE, LME	Exchange trading matching systems	CME Clearing, Liffe Clear, ICE Clear, LCH.Clearnet
	OTC	Physical trades, structured trades and swaps	EBS, LME Select, Trayport, Bloomberg Chat	Energy: e-confirm (ICE), EFET Metal: e-confirm, SWIFT	ICE Clear Europe, CME Clearport
Equity	Exchange	Futures and options	Eurex, Liffe, CBOE	Exchange trading matching systems	Eurex Clearing, Liffe Clear, OCC
	OTC	Options, structured trades and swaps	ICAP, TFS, Tullet	Markit Wire	BClear

3.1. Credit default swaps

This section focuses on credit default swaps (CDS), the most common type of credit derivative.

3.1.1. Nature of contracts

A CDS is a contract between two counterparties under which the protection buyer will pay an annual fee (on a quarterly basis) to the protection seller until the maturity date of the contract or until a credit event occurs on the reference entity. In the latter case, the protection buyer must deliver bonds or loans of that reference entity for the amount of the protection (notional value of the contract) to the protection seller and receives the par value in return.

A CDS insure against a credit event occurring on a single reference entity ("single name"), which can be a company or a sovereign, or on a portfolio of such entities, for example through an index. Such an index is constructed to reflect the performance of a segment of the credit market, for example large European companies with relatively good credit ratings ("investment grade").

Credit events for CDS are typically: i) bankruptcy, ii) failure to pay, and iii) restructuring. CDS contracts are governed by a ISDA Master Agreements and those on European reference entities are usually transacted under the English Law, whereas those on North American reference entities are usually under the New York Law.

Euro denominated CDS are generally transacted for €5 or 10 million of notional and 5 or 10 years of maturity. Accordingly, in case of €10m notional sold at 100bp, the buyer of protection will pay €100,000 per year until maturity or until a credit event on the underlying reference entities occurs, in which case he will receive €10m in return for the bonds or loans to be delivered.

3.1.2. *Market structure*

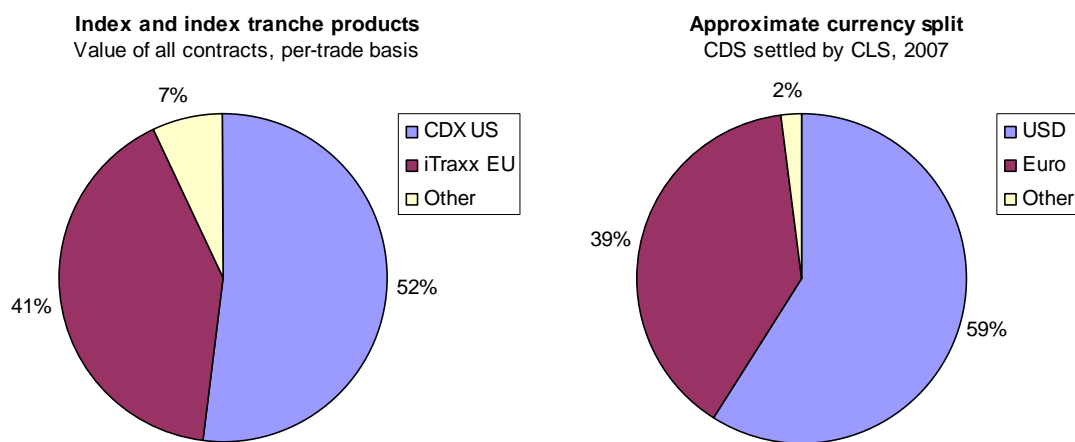
According to ISDA, the total notional amount outstanding of CDS was equal to USD 38.6 trillion at the end of 2008, down from \$54 trillion in mid-2008 and from \$62.2 trillion by the end of 2007.²⁴ According to data from DTCC's Trade Information Warehouse (TIW), which claims to cover roughly 90% of the market and publish weekly data, on 22 May 2009 the total gross notional outstanding was equal to \$29 trillion, divided in \$15.4 trillion in single names contracts, \$9.7 trillion in indices, \$3.9tn in tranches. Of the outstanding amounts recorded by the DTCC, \$24.2 trillion were due to dealer-to-dealer transactions. The total gross notional amount outstanding is reduced to \$2.5 trillion if considered in net terms.

The difference between gross and net can be easily explained by one example. Assuming that A sells \$10m protection to B, B to C, C to D. A is a net seller of \$10m and D a net buyer of \$10m protection. Therefore, the net exposure is \$10m and the gross \$30m. However, the gross exposure is particularly relevant in terms of overall risk because B and C though having a net position are exposed to both legs of the transaction. Therefore, the counterparty risk is measured by gross rather than by net exposures. This explains the appeal of portfolio compression services, particularly as regards credit default swaps.²⁵

²⁴ ISDA (2009a).

²⁵ According to TriOptima, a company offering a portfolio compression service called triReduce, in 2008 they eliminated \$30.2tn in notional by reducing gross to net. The largest part of this reduction is in CDS indices which are much more standardised. See chapter 2.4.3 for further details on trade compression.

Chart 5: The European share of the global CDS market



Sources: DTCC and ECB

The European dimension of CDS markets is significant, in terms of number of single names contracts, 37% are written on European corporates (the majority) or European Sovereigns²⁶. The corresponding number for North American single names contracts amounts to 51% of total CDS on single names. Of the European contracts, the large majority (80.9%) is denominated in euro, 18.8% and the rest in GBP and other currencies. For US reference entities, 7.8% of the total outstanding is denominated in Euro. As for the indices, 41% of the total outstanding is on iTraxx European products, 52% on North American CDX and 7% on other products. Considering the total split per currency of the CDS settled by CLS in 2007, 39% was in Euro, 59% in USD and 2% in other currencies.

3.1.3. Risk characteristics

Like other OTC derivative markets, credit derivatives markets are built on products that bind together institutions and markets in ways that are difficult to understand and survey both at institutional and systemic level. While CDS are relatively small compared to other OTC derivatives markets, they are particularly significant in terms of risk:

- Banks' CDS exposures relative to total assets have increased significantly in recent years. CDS markets are closely linked to securities markets and CDS markets are highly concentrated.
- Their pay-off is discontinuous. In normal times, selling protection is an attractive proposition. For sure, the seller of protection assumes a risk of having to pay out the full amount of the insurance if the reference entity defaults, but he may expect, with a certain degree of confidence, that in most cases no payment will need to be made. In the meantime he earns a continuous stream of revenue from the buyer of protection. The discontinuity in the payoff profile and the fact that in most cases the underwriter suffers no loss, have transformed CDS from being a hedging instrument to a popular revenue-generating instrument. The extreme risk associated with this discontinuous pay-off characteristic has been amply exposed by the crisis. For example, by the second quarter of 2008 AIG had sold approximately \$307bn CDS for 'regulatory capital forbearance' reasons to European firms. By the end of year, AIG had suffered losses in excess of \$30bn on these CDS while

²⁶ Data as end of March 2009.

only earning \$157m during the first half of 2008.²⁷ AIG's problems were not isolated, which validates a 2004 finding by McKinsey that many firms entered the CDS market "on the cheap"; lured by high revenues but unwilling to make the necessary investments in risk management capabilities.²⁸

- Contracts are non-fungible. This is the reason behind the great counterparty risk embedded in CDSs and explains the big disproportion, underling above, between notional amount outstanding and net exposure. Because of non-fungibility, market participants that wish to close a position can only do so by going back to the original counterparty (usually a dealer). This gives the dealer a certain amount of market and hence pricing power. Market participants could also achieve the same economic effect by entering into an opposite position with a different counterparty; while this would effectively eliminate the risk related to the instrument itself, it would not eliminate counterparty risk (if one of the counterparties defaulted, the hedge would be undone).
- The market is opaque. Compared to interest rate swaps, where risks are well understood and contracts rely on widely available and tested macro-economic data for their pricing, it is more difficult to evaluate risk for CDS.²⁹ The data needed to evaluate risk is of microeconomic nature (e.g. firms' balance sheets), which is more scarce and often less authoritative. The lack of authoritative data combined with the zero-sum game characteristic outlined above is also conducive to volatility, as the price of protection varies depending on the perceived healthiness of the underlying reference entity.
- As highlighted by the Turner Review, CDS prices systematically understate risk in the upswing and understate it in the downswing. Unrestricted CDS trading can accordingly make the price of credit more volatile, which at the extreme can even trigger credit default events. Such events create significant disruption costs on the real economy. This is particularly dangerous when the object of the CDS is a bank. In view of banks' central role in the economy, a bank failure has particularly serious consequences for the economy.³⁰

3.1.4. Market standardisation - Recent industry developments

The recent market developments can be divided in contractual modifications and CDS standardisation.

3.1.4.1. Contractual modifications

ISDA promoted contractual modifications which entered into effect on 8th April 2009 with the aim of improving market standardisation. These contractual modifications relate to: i) the establishment of determination committees; ii) the hardwiring of the auction mechanism; iii) rolling effective date. In adhering to the protocol (so called big bang protocol) the parties accept the changes in the ISDA credit definitions which apply at global level. More than 2,000 market participants agreed to adhere to the protocol. The changes apply to both new and existing transactions. Loan only transactions, U.S. Municipal type transactions, Credit derivatives transactions on asset backed securities and back-to-back credit derivatives transactions relating to trust certificates linked to CDX indices are not covered by the protocol.

²⁷ Financial Times (2009).

²⁸ Gerken, A. and H. Karseras (2004).

²⁹ *ibid.*

³⁰ FSA (2009).

The March 2009 Supplements establishes five regional determination committees (DCs): 1) Americas, 2) Japan, 3) Asia ex Japan, 4) EMEA (Europe, Middle East and Africa), 5) Australia-New Zealand. Each DC consist of eight global dealers voting members, two regional voting members, five global non-dealers (buy-side) voting members and two consultative global dealers, one regional consultative dealer and one consultative non dealer as alternate non voting members. The DCs make binding determinations of whether credit and succession events have occurred and when. They will also determine whether to hold one or more auctions and the specific terms of any auction. The purpose of the DC is to prevent a situation in which the two parties in a CDS contract do not agree on whether an event has taken place.

The hardwiring of the auction process implies that physical settlement outside the auction process would be no longer possible. Before the entrance into effect of the big bang protocol, participants had the option to participate or not in an auction. Since the auction process is used to determine the final recovery rate of a defaulted entities, the greater the participation to the auction, the more realistic the recovery rate is. The auction settlement process under the big bang protocol covers bankruptcy and failure to pay, but not restructuring.

The effective date for all CDS contract will be changed to the current day less 60 days for credit events and the current day less 90 days for succession events. The effective date rolls each day for all positions so that they match the effective date of new trades. Before the entrance into force of the Big Bang protocol the protection began at T+1, therefore two opposite trades on the same reference entities, same notional but different dates could not perfectly offset.

3.1.4.2. The restructuring credit event

Restructuring means that in order to prevent a default of a company, bond and loan holders agree to worsen their terms, by e.g. a reduction in coupon or in the principal or an extension in maturity. This decision is binding to all holders.

Generally only certain bonds or loans of a particular issuer are restructured. However, the event generally affects all the issuance of that particular entity, with the effect that longer dated bonds or loans are typically cheaper to deliver.

The occurrence of restructuring gives the buyer and the seller of CDS the option to trigger the contract upon that credit event (if the credit event is covered) and therefore settling it. However if the buyer triggers the contract, maturity limitation dates applies to the deliverable obligations (maturity cap). The reason for that is to reduce the value of the protection buyer's cheapest to deliver option (i.e. that the longer dated bonds or loans are delivered). In case it is the seller to trigger the contract, no maturity limitation applies. Different maturity caps apply depending on the convention under which the contract is concluded:

- Under Modified Restructuring (MR), deliverable obligations must not have a maturity date longer than the minimum between 30 months after the restructuring date and the highest maturity of the restructured bonds or loans. In any case, it is always possible to deliver bonds or loans that mature up to the maturity date of the CDS and it is never possible to deliver bonds that mature more than 30 months after the maturity date of the CDS.
- Under the Modified Modified Restructuring (MMR), the maturity of the obligations that may be delivered cannot be longer than the latest of the following: i) 60 months after the restructuring date for restructured obligations; ii) 30 months after the restructuring date for all obligations; iii) the CDS maturity date.

In general North American names follow a MR convention and European names a MMR. Restructuring is not covered by CDS on CDX indices, whereas CDS on iTraxx indices follow a MMR convention.

As described below, under the new standard, North American contracts will trade without restructuring since in the U.S. the restructuring activity is generally conducted through a Chapter 11 process which gives rise to a bankruptcy credit event. However, the majority of North American CDS single name outstanding have restructuring and even if the probability of occurrence is low, the buyer of protection cannot be asked to abandon it without being compensated for the loss in protection.

Furthermore, under Basel II CDS without restructuring are only partially (60%) recognised as credit mitigation instruments. Therefore, banks that fall under Basel II are less likely to accept the new market convention, since they will face a 40% regulatory capital charge.

The easy solution proposed by the industry is to eliminate the partial recognition in Basel II, justifying that by the low value attached by the market to the restructuring clause. However, that low market value is true only for North American contracts and is linked to the low probability of occurrence. In Europe, any attempt to offer contracts without restructuring failed because buyers want to protect against that credit event, which is much more common. The reasons for maintaining restructuring in Europe are therefore not simply linked to the regulatory capital charge, which is essential to retain in view of the likelihood of the restructuring credit event.

Since restructuring will be maintained in European standard contracts, CCP clearing of these contracts faces two challenges:

- (1) The optional and asymmetric trigger, as described above both buyer and seller may trigger, but if the buyer triggers it faces a maturity limitation. Furthermore, the buyer may decide not to trigger hoping that the underlying defaults and so earning more. The problem of the CCP is that if triggering is selective, it does not know who to trigger on the other side. To solve this problem, CCPs are devising particular allocation mechanisms to cope with selective triggering.
- (2) The need to make a separate auction for each different restructuring maturity limitation date. Since maturity limitation dates are continuous, this would require an infinite number of auctions. This problem could be solved by splitting contracts into maturity buckets and then run separate auctions for each bucket. The current proposal, detailed in a term sheet released by ISDA on 19 June, foresees eight maturity buckets: 2.5yrs, 5yrs, 7.5yrs, 10yrs, 12.5yrs, 15 yrs, 20yrs, 30yrs. The first is a "blended" bucket where deliverable obligations may have maturity of no more than 2.5yrs for non-restructured obligations and no more than 5yrs for restructured. A pre-2.5yrs maturity buckets is foreseen for MR only. All the other buy-triggered buckets have maturity obligation of no more than that particular bucket and are valid for CDS with maturity dates between the bucket and the former one. All seller triggered transactions go in the 30yrs buckets. Furthermore, a rounding down convention is foreseen in case there are not deliverable obligations falling under the specific bucket and a option to move is given in case no auction will be run for the relevant bucket.

In order to implement (2) and to define the role of the Determination Committees to establish when a restructuring credit event takes place and how to run the different auctions, a new protocol (Small Bang) will need to be agreed by market players. Under the current schedule, the protocol will be published on the second week of July, with adherence period ending on the 24 July.

The restructuring credit event adds a level of complexity in the CCP clearing of CDS indices. In fact, while the settlement of the single name in the index affected by restructuring follows the process described above, the optionality of the trigger in an index has other repercussions. If restructuring on an index component occurs, there might be two possibilities: a) either the index itself is trigger and two indices are created (one with the single name and another without); or b) only one index minus the single name is created and the trigger is exercised on the single name. Option a) creates the problem of indices proliferation if more than one restructuring credit event affects the index components. Basically a combination of indices needs to be created to cater with all the possible options of single names triggered or not. This proliferation is hardly manageable by CCPs and has the negative effect of fragmenting liquidity between all indices. This problem may be solved with option b), which, however, has other impacts on index tranches. According to the above mentioned term sheet, option b) will be adopted as a market convention. Since tranching transactions will not be cleared by CCPs for the time being, ISDA will further develop an appropriate mechanism to deal with tranching transactions at a later stage.

3.1.4.3. Standardisation of coupons

Under the new North American convention, single names CDS will trade with a fixed coupon of 100bp, 500bp or both and without restructuring. It is expected that liquidity will tend to the closest strike to par and therefore investment grades will trade with 100bp fixed coupon and high yield will trade with 500bp. In Europe, as of 22 June 2009 a new market convention has been adopted. According to this convention, firms will trade European CDS using the following fixed coupons: 25, 100, 500 and 1000bp for new trades and 300 and 750bp for recouping existing trades.

The reason for coupon harmonisation is that, in absence of any convention, CDS traded at par, i.e. the coupons was determined at the time of the trade, therefore multiple strikes were available on the market and trades could not easily offset.

While fixed coupons have the benefit to bring liquidity to one or the other coupon, it has the negative effect that an upfront payment is due at time of trade. This upfront payment will be smaller or larger, depending on how far from the par spread the fixed coupon is. Furthermore, under the floating coupons system, CDSs have "short first coupons", meaning that if there are less than three months to the first coupon, the first payment is smaller. Under the fixed coupons convention, the first coupon is a full coupon and the protection seller need to incorporate accrued interests in the price of the CDS.

Converting between upfront and spread is model dependent. For this reason a quoted spread will be introduced. This quoted spread assume a flat credit spread curve, but since spreads curves are not flat, the par spread and the quoted spread will differ. This means that there will be three ways to express the price of a CDS: upfront, quoted spread, par spread. It is clear that the closest the par spread is to the fixed coupon the less sensitive to valuation assumptions the price of the CDS will be. In this sense it is argued that multiple coupons are more transparent. However, in practice the above three prices will be available to market participants.

In order to convert existing trades in the new standards each trade will be split into new trades with fixed coupons. However, with only two fixed coupons, recouping existing trade with restructuring does not always preserve the risk profile of the existing trade. In particular, when the spread of the original trade lies outside of the range of the available coupons (less than 100bp or more than 500bp), one of the resulting trade will be in the opposite direction and as mentioned above, under restructuring buyer and seller have not the same obligations. For example, assuming an original trade of €10m notional and 660bp spread and a buy

position, under the 100/500 convention it will be converted in a sell of €4m with 100bp coupon and a buy of €14m with 500bp coupon. This implies that the presence of restructuring require the necessity of more coupons for recouping existing trades. In fact, under the agreed EU convention, existing trades would always be converted into two contracts having the same direction. Since also North American legacy contracts have restructuring, the presence of more coupons, at least for recouping, will be necessary in the US as well.

The standardisation of coupons will facilitate CCP clearing of single names contracts, by concentrating liquidity on certain coupons. However, it is not strictly necessary as CCPs would be able to clear also floating coupons contracts.

3.1.5. Market infrastructure

In terms of market infrastructure, CDS has invested heavily in recent years.

- **Trade execution:** Inter-dealer transactions takes place on electronic platforms provided by inter-dealers brokers. Dealer-to-client transactions may occur by phone or through dealer-to-client platforms..
- **Trade confirmation:** substantial improvements have been made to reduce the operational risk related to the execution of CDS. They are special even in this respect, with 97% of electronic volume as a percentage of total volume, 92% of electronic confirmations and 97% eligibility for electronic confirmations. All these numbers are well above all the other OTC derivatives products. The most widely used affirmation and confirmation system for CDS is called Deriv/SERV and is offered by a subsidiary of the DTCC. According to DTCC data, 90% of CDS transactions are confirmed within T+1.
- **Data repository:** All the trades that are electronically confirmed through Deriv/SERV are recorded in the Trade Information Warehouse (TIW), a central database run by Deriv/SERV.
- **Price transparency:** Price information on CDS is provided, among others, by Markit which collect the information from different market makers and makes it available to its customers. This company also runs a reference entities database (Markit RED), which provides unique alphanumeric RED codes that enable financial institutions to efficiently confirm trades and manage their positions. CDS indices (iTraxx and CDX) are also managed by Markit. In order to improve market transparency in the CDS market, Markit makes publicly available free of charge a daily report where it publishes the last quote any active dealer in the CDS market makes available to its institutional clients before 4:00pm on the most liquid contracts, representing roughly 450 entities.

The Trade Information Warehouse

The registration in the TIW does not change the legal nature of a contract between the two original counterparties. The TIW facilitates the post-trading operation of the registered trades and it is particularly relevant for CDS due to the number of corporate events that may influence the contracts.

Services

The TIW currently performs the following functions: (i) payment calculation for one-time fees and coupons, (ii) multi-currency payment netting and central settlement, provided in partnership with CLS Bank International, (iii) centralized processing of credit events such as bankruptcies and defaults, and (iv) novation consent that automates the approval process when one party to a transaction assigns its position to another.

Contribution to transparency

Since most of the transactions on the CDSs are recorded in the TIW, it represents an essential source of information both for the public and from a regulatory perspective. Basically the TIW can detect the positions

(exposures) of all its participants, all the static information concerning the registered contracts and information on the new and terminated transactions registered with the TIW.

In an effort to improve transparency in the CDS market, the TIW since October 2008 makes publicly available on a weekly basis the following aggregate information: (i) gross notional outstanding per customer type (Dealer/Non Dealer) and product type (single names, indices and tranches), (ii) single names reference entities types (by sector) by buyer and seller of protection, (iii) on the run/off the run indices and tranches by buyer and seller of protection, (iv) top 1000 reference entities (gross and net notional), (v) all indices and tranches (gross and net notional), (vi) aggregate single name contracts by year of termination date, (vii) change in weekly activity for all the above, and (viii) weekly transaction activity (new trades, terminations, assignments).

Since market players have already invested highly in the warehouse and in other facilities that improve the operational efficiency of the market, they want to leverage to the maximum extent possible the existing infrastructure in moving to CCP clearing. In this sense, the TIW becomes an essential infrastructure for all CCPs that want to offer clearing services in CDSs and receive the information on confirmed trades from the TIW.

Comparison with CCPs

The level of information held by a CCP once a CDS is cleared is not inferior to the information held by the TIW. However, not all the CDSs registered in the TIW will be CCP eligible, therefore even after CCP clearing will be implemented, the TIW will represent an essential source of information. For this reason and for the central role played by the TIW in the CDS market, it will be probably become a regulated entity subject to the supervision of the Federal Reserve Bank of New York and New York State Banking Department.

CESR is conducting a feasibility study for the eventual establishment of a trade warehouse in the EU to support EU CCPs.

3.1.6. Risk management – the gradual advent of CCP clearing

CDS is a young market and clearing has so far been done on a bilateral basis. However, as a result of the financial crisis, regulators around the world have pushed industry to adopt CCP clearing.

In the US, ICE Trust is live since the beginning of the year and it has so far (as of end of May 2009) cleared volumes amounting to USD 600 billion.

In Europe, there are currently four providers running clearing systems notified under Directive 98/26/EC Settlement Finality Directive (SFD) that provide or aim to provide CCP clearing services for CDSs (in order of announcement of their service):

- BClear, operated by NYSE Liffe and LCH.Clearnet Ltd (operational since December 2008, but that has recently announced its intention not to make any further investment into the project at this point);
- Eurex Clearing;
- ICE Clear Europe;
- LCH.Clearnet SA.

Apart from the four providers above who either have developed, or are in the process of developing, their solutions, there is also a potential fifth entrant in the European market, i.e. the Chicago Mercantile Exchange (CME), which has initiated the process for the authorisation as a Recognised Clearing House (RCH) in the United Kingdom.

All offers differ in many aspects, e.g. membership requirements, indirect access availability, default fund contribution, default management procedures, operational flows and time to market.

3.2. Interest rate derivatives

Interest rate derivatives are by far the most popular derivative instruments traded OTC. This section outlines the characteristics of this mature market.

3.2.1. Nature of contracts

Interest rate derivatives exist to facilitate the management of specific and structural interest rate risks faced by clients. There are many types of interest rate derivatives, the major ones being interest rate swaps, interest rate options and forward rate contracts. An interest rate swap is an agreement to exchange one set of cash flows (perceived as risky, as linked to e.g. a floating interest rate) against another set of cash flows (perceived as stable, as linked to, say a fixed interest rate).

3.2.2. Market structure

Interest rate derivatives are the largest asset class of OTC derivatives. As of end-2008, the overall size of the market for interest rate derivatives was \$418.6 trillion.³¹ Of these, interest rate swaps account for the overwhelming market share. The popularity of IRS is explained by a number of factors, including that (i) they are ‘self-funded’ in the sense that there is no principal payment at the outset, (ii) they are relatively easy to price, as well-defined swap curves exist even for long maturities, and (iii) the liquid Euribor market makes it easy for market making dealers to hedge the risk they take on.

Table 3: Interest rate contracts, on- and off-exchange

Notional amounts outstanding, USDbn, December 2008

	OTC	On exchange
Interest rate swaps	328.114	19.3
Interest rate options	51.301	35.2
Forward rate contracts	39.268	n.a.

Source: BIS (2009).

The listed interest rate futures market developed in the 1970s, in order to satisfy issuers that wanted to be able to issue the kind of debt requested by investors (fixed rate, long term). To do so, the issuer needed to hedge, hence need for a future market. The off-exchange interest rate market developed in the 1980s, as issuers' needs became more diverse. Today, the OTC market dwarfs the listed market in terms of notional outstanding³². While the OTC interest rate swap market is the biggest market in terms of notional, the amount of transactions is fewer compared to e.g. CDS.

The OTC interest rate market is deep. It has a wide variety of customers (e.g. issuers, fund managers, banks, hedge funds, corporates, sovereigns and insurance companies). In terms of dealers, while the leading dealers dominate, there is nevertheless a long tail of second tier institutions. Accordingly, the counterparty make up is different compared to e.g. CDS (thousands of counterparties for IRS as compared to hundreds for CDS).

³¹ BIS (2009a).

³² It should, however, be recognised that standardised on-exchange contracts perfectly off-set each other, whereas OTC derivatives are not perfectly fungible and in order to reduce the notional amount outstanding portfolio compression sessions need to be run.

3.2.3. *Market infrastructure*

The OTC rate market is also mature in terms of market infrastructure:

- **Trade execution:** there are three types of trading methods. First, the so-called direct market, where banks negotiate directly (voice-based). Second, the inter-dealer market (voice and electronic) and, third, the dealer to client market (voice or electronic execution platforms). Overall, voice continues to dominate given the bespoke nature of the market.
- **Trade confirmation:** The majority of trades are since 2002 electronically confirmed via Markit Wire (formerly Swaps Wire). This has an impact on process flow: execution, affirmation and confirmation take place at T+0. While electronic volumes for long trailed non-electronic volumes, the relationship has been reversed since the default of Lehman. The share of electronically eligible volume among the major dealers is above 90% and within that universe, nearly 80% are actually electronically confirmed. To expand the reach of electronic trade confirmation further requires broadening the scope of products covered by Markit Wire and expanding its use by second tier banks and customers.

3.2.4. *Risk characteristics*

The risks encountered in interest rate contracts are different from, say, CDS. Most importantly, the pay-out structure associated with the rights and obligations with a contract are continuous in nature, as these rights and obligations evolve as the underlying market moves. Unlike CDS, where the protection seller faces a binary pay-off (small fee received in normal times, but need to provision for materialisation of tail risk with enormous consequences), an interest rate swap seller's rights and obligations are more continuous in nature; as interest rates evolve, so does the related cash flow arising from the net rights and obligations. Also the underlying data (interest rates) are transparent and widely available.. For these reasons, interest rates swaps were mostly used for hedging and could hardly be misused. Even though interest rate shocks may occur, this does not dramatically alter the balance of rights and obligations as it is the case in CDS (e.g. jump-to-default).

3.2.5. *Risk management*

Similar to other OTC derivatives, risk management occurs at different levels. First, sales personnel operate on the basis of dealer's assessment of appetite for entering into a deal with a particular counterparty (based on assessment of risk associated with particular counterparty). Second, dealers hedge the exposure they take in that transaction. Third, provision of collateral.

The interest rate OTC market has, as outlined above, a CCP in place. Risk management therefore differs depending on whether rate contracts are cleared or not.

3.2.5.1. CCP clearing - SwapClear

SwapClear is currently the dominant provider of CCP clearing services for interest rate swaps. Operated by LCH.Clearnet Ltd, it is in place since 1999. Legal contracts were already sufficiently standardised under the ISDA master agreement and the terms of the contracts did not need to further standardisation to allow CCP clearing. SwapClear has thrived even though contracts remain largely tailored to bespoke needs. The necessary prerequisites for CCP clearing in the rate space were: (i) confirmed matched trade, (ii) a risk engine, and (iii) default management process. In addition, a more concentrated liquidity has also contributed to enabling CCP clearing in comparison with CDS, where liquidity is much more fragmented,

with thousands of reference entities, than for IRS, where key currencies are limited to a dozen.

Governance of SwapClear is shared between LCH.Clearnet and the major 13 dealers organised within OTC DerivNet. SwapClear currently has 24 General Clearing Members (GCMs). The governance of SwapClear and its GCMs play a crucial role in managing a potential default of another GCM. Since its inception, both LCH.Clearnet and the GCMs have focused on ensuring a safe and sound CCP. This has been done by a close interaction between dealers and the CCP, stringent membership criteria, strong margin requirements and a detailed and ex-ante worked out process for dealers and the CCP to work together in managing defaults. Furthermore, LCH.Clearnet has recently announced the extension of its services to buy-side institutions that would be allowed to access the CCP via a clearing member. This and other measures to expand the coverage of SwapClear are further outlined in chapter 4.

It is estimated that currently SwapClear clears around 20% of the OTC interest rate market. For intra-dealer flow, the share is significantly higher, with cleared volumes amounting to around 50% of overall dealer-to-dealer notional outstanding. For CCP eligible trades, the vast majority of new interest rate trades are cleared by SwapClear (83-93% of eligible trades).

The default management process of SwapClear

When a GCM defaults, the Default Management Group – comprising a subset of the GCMs – second trading personnel to LCH.Clearnet.

The DMG acting on behalf of LCH.Clearnet quantifies and hedges the risk from the default.

LCH.Clearnet conducts auctions to sell the defaulter's portfolio.

All SwapClear members are required to bid in these auctions. Accordingly, prospective GCMs need to demonstrate the ability to effectively carry out this obligation.

If there are losses, they are allocated as follows: (i) the defaulting GCM's initial margin, (ii) the defaulting GCM's default fund contribution, (iii) part of LCH.Clearnet's profits, (iv) other GCMs' default fund contributions, (v) further fixed cash contributions from the other GCMs', and (vi) LCH.Clearnet's share capital.

This process proved its worth following the default of Lehman Brothers. Lehman's EUR7 trillion portfolio of 66,000 trades across five currencies was replaced and less than 50% of Lehman Brother's initial margins (the first bulwark of defence) was required to hedge the risk, manage and auction the position.

While SwapClear is so far the only CCP for interest rate contracts, there are signs of other CCPs entering the rate market. The International Derivatives Clearing Group (IDCG), a US based CCP that is majority-owned by NASDAQ OMX has recently started to clear interest rate contracts, albeit from a very small base.

3.2.5.2. Bilateral clearing

For trades that are not eligible for CCP clearing, the normal approach to collateralisations of bilateral credit exposure applies, as outlined above. According to ISDA, 63% of credit exposure as share of trade volume is collateralised for fixed income (71% as share of exposure).

Moreover, portfolio compression and reconciliation services are increasingly used in the rate space. Currently, market participants use triResolve to reconcile cash flows between themselves and triReduce to tear up economically redundant trades.

Portfolio compression cycle has also been tested *within* SwapClear. Portfolio compression has benefits also for a CCP: while multilateral netting provided by CCP offers a single net credit risk of each counterparty, that risk is calculated by assessing all trades in system. Trade compression reduces the number of trades (tear up many old trades, replace with one trade mimicking original portfolio's economic risk profile). This is beneficial, as (i) reduces

information space and (ii) reduces complexity (Lehman: need to assess all outstanding trades, hence value in reducing number of trades per se).

3.3. Equity Derivatives

Equity derivatives are one of the smallest OTC derivative segments, with a sizeable listed element. Equity derivatives are much smaller than the underlying market. Equity derivatives are also a relatively young instrument, which is illustrated by the limited lack of standardisation and relatively novel infrastructure arrangements.

3.3.1. Nature of contract

There are three types of equity derivatives OTC contracts: options, equity swaps and variance swaps. As regards equity options, there are two types of equity options, calls and puts. A call option gives its holder the right to buy an underlying security, while a put option gives the right to sell an underlying security. In an equity swap, counterparties make payments to each other with at least one set of payments being set by a share or an index return. The other payments can be fixed or floating rates, or the return of another share or index. A variance swap allows investors to trade future realised (or historical) volatility against current implied volatility.

3.3.2. Market structure

The equity derivatives market is not global, but fragmented. Fragmentation follows that of the underlying equity markets. Regionalisation is segmented by the fact that trading the equity derivative in a different region exposes the dealer to a legal basis risk (especially as regards corporate action rules). BIS estimates suggest that Europe is the biggest regional market.

Table 4: Regional distribution of OTC equity derivatives markets

Notional amounts outstanding, USDbn, December 2008

Region	\$bn
European Equities	4,036
US Equities	1,505
Japanese Equities	403
Other Asian Equities	185
Latin American Equities	99
Other Equities	266

Source: BIS (2009)

The OTC equity derivatives market is smaller than the CDS and interest rate markets, amounting to \$6.5 trillion in notional amounts outstanding by the end of 2008.³³ The equity derivatives market shrank from \$10 trillion to \$6.5 trillion from June to December 2008. The exchange traded market amounted to \$5.1 trillion by the end of 2008.³⁴ The market of the underlying cash equities pool remains significantly bigger than the derivatives pool, with global cash equity market capitalisation standing at \$32.5 trillion by the end of 2008.³⁵

Table 5: Equity derivative contracts traded on and off-exchange

Notional amounts outstanding, USDbn, December 2008

³³ BIS (2009a).

³⁴ BIS (2009b)

³⁵ World Federation of Exchanges (2009).

	\$bn
OTC	
Forwards and swaps	1,632
Options	4,862
On exchange	
Equity index futures	0.7
Equity index options	4.4

Source: BIS (2009).

The balance between listed vs. OTC differs between regions. For example, the US market is characterised by more trading on rather than off-exchange. The main reasons for that are: (i) a highly efficient listed options market with six competing exchanges served by a single CCP (The OCC) and fungible contracts, (ii) pre-trade transparency (obligation to display OTC quotes on exchange floor), and (iii) retail dominated order flow. By contrast, the European equity derivatives market is more OTC, as clearing is fragmented, the market is largely dominated by professional investors and currently the MiFID transparency requirements only apply to financial instruments admitted to trading on a regulated market.

Compared to e.g. CDS, dealer-to-dealer business is less dominant in OTC equity derivatives. The largest global dealers face competition from second tier regional/local dealers in all markets.

3.3.3. Market standardisation

The equity derivatives market is not very standardised. While contracts are often concluded under the umbrella of either ISDA, regional, country or dealer bespoke Master Confirmation Agreements, they are more customised in terms of e.g. dividends, valuation mechanism, or corporate events.

Equity derivative contracts are accordingly not contractually fungible. Moreover, the processes for managing corporate events are less formalised compared to the CDS market (especially after the Big Bang protocol). Accordingly, while it is easier to value the economic consequences of an event for an equity derivative contract compared to a CDS, the number of events is much higher.

3.3.4. Market infrastructure

The equity derivative market is relatively young and infrastructure appears less well developed compared to some other more mature OTC derivatives asset classes, notably interest rate derivatives. More specifically:

- **Trade execution:** trade execution occurs either on inter-dealer networks (e.g. ICAP, TFS and Tullet) or internally within the broker if it is a client trade.
- **Trade confirmation:** Markit Wire and DTCC's DerivNet remain the reference networks for electronic trade affirmation and confirmation. However, compared to other OTC derivatives asset classes, only a small share (around 20%) of total trade volume of equity derivatives are eligible for electronic affirmation/confirmation. Moreover, this share has decreased recently, which may be due to the fact that there is currently more demand for more bespoke, and accordingly less standardised and electronically eligible, equity derivative contracts. However, within the electronically eligible category it is evident that the major dealers have made an effort to ensure that such trades are indeed confirmed electronically, as manifested by a trend increase in recently with electronic confirmation rates as share of electronically eligible reaching around 85%. This share is close to 100%

for the largest global dealers (G16).³⁶ However, the wide diversity of plain vanilla equity derivatives appear to come with a cost in terms of the time it takes to affirm and confirm contracts. While backlogs have been reduced, it has proved difficult to eliminate outstanding confirmations aged over 30 days. This significant time is due to the diversity in MCAs and the limited rate of electronic confirmations. The time it takes to confirm in general depends on whether (i) MCA is in place (trade easily confirmed within a week), and (ii) electronically eligible (easily confirmed within hours). The limited uptake of electronic confirmation is primarily due to second tier of market (local institutions that see less value of investing and upgrading of internal procedures).

- **Trade repository:** Industry is currently debating merits of developing centralised post-trade solution (e.g. corporate action processing) à la DTCC's Trade Information Warehouse.

3.3.5. *Risk characteristics*

Compared to e.g. CDS, equity derivatives have a less dramatic pay-out structure. It is not binary, but continuous. Accordingly, the consequences of an event in the equity derivatives space are less dramatic (often contract alterations, not necessarily pay-out).

Another factor that moderates the risk of this class of derivatives is that they are easier to value compared to e.g. CDS, as an objective, observable and tradable market prices exist in most circumstances thanks to the price discovery provided by the trading venue where the underlying cash equity is listed and other venues where it is traded.

In equity OTC derivatives markets MCAs are generally concluded between the parties and these govern the general trading relation between a dealer and a client for a given portfolio. When a trade is actually concluded, the exact details of that transaction often follow a negative affirmation procedure. Under negative affirmation, equity swaps are confirmed through a unilateral communication from the dealer to the client that is not countersigned by the client. Confirmations are typically brief statements of the remaining trade variables: e.g. ticker, price, quantity and currency. If client does not come back within 5 days, the transaction is considered confirmed. The risk associated with this market practice is client repudiation, as the dealer does not have a countersigned agreement evidencing the trade.

3.3.6. *Risk management*

As with other OTC derivatives, managing the counterparty credit risk associated with equity derivatives involve either the use of a CCP or the reliance on bilateral collateral management.

As regards bilateral clearing, the share of credit exposure that is covered by collateral is relatively limited, amounting (according to ISDA) to 52% by the end of 2008. While portfolio reconciliation services lend themselves equally well to equity derivatives, portfolio compression services do so less, as the high level of customisation of even plain vanilla contracts (e.g. strike price, treatment of market events etc) makes it difficult to find suitable matching trades to tear up.

As regards CCP clearing, almost all derivatives exchanges allow clearing uptake of OTC-traded transactions where the derivative contract is listed on the exchange. There are attempts to offer CCP clearing services for non-listed, OTC-traded equity derivative contracts (e.g. Liffe's BCclear solution).

³⁶ Markit (2009)

Overall though, CCP clearing for OTC trades appears to be hampered by various issues, e.g. different treatment of corporate action events by CCPs. It is therefore desirable that the major CCPs and exchanges continue efforts of harmonising their treatment in this respect.

3.4. Commodity derivatives

Commodity derivatives exist since a long time. This market is incredibly diverse. The market structure differs depending on segment, with some being more standardised and subject to CCP clearing, with others being pure OTC.

3.4.1. Nature of contracts

The same types of contracts exist in commodities, i.e. futures, options, forwards and swaps. Their relative weights are summarised in the table below. Unfortunately, the numbers are not comparable, as OTC is quoted in notional amounts outstanding and on-exchange in number of contracts.

Table 6: Commodity derivative contracts traded on and off-exchange

December 2008

	bn
OTC , notional amount outstanding	
Forwards and swaps	\$2,624
Options	\$1,797
On exchange , turnover (number of contracts)	
Futures	1.6
Options	0.2

Source: BIS (2009).

3.4.2. Market structure

The commodity derivatives market is very diverse and comprises several market segments, including e.g. gas trading, base metals trading, power trading, crude oil trading, agriculture trading and emissions trading just to mention a few.

These segments trade both on exchange and OTC and can be both financially and physically settled.

Commodity derivatives involve a broad range of market participants, e.g. financial firms (banks, investment firms), international energy firms, specialised energy traders, power producers, energy distribution and supply companies (be they public or private) and other corporate and government actors as well as consumers.

3.4.3. Market standardisation

Commodity derivatives are relatively non-standardised. Vanilla trades are often tailored to client needs (e.g. in terms of payout and valuation mechanism). Moreover, there are several Master Confirmation Agreements (MCAs), including both the ISDA global one as well as those of other governing bodies (e.g. EFET, NBP). The multitude of market conventions and rules is driven by product specificities related to physical delivery of the underlying commodity.

3.4.4. OTC trade execution

In view of bespoke and non-standardised nature, most OTC commodity trades are voice-brokered. However, execution networks such as EBS, LME Select, Trayport and Bloomberg Chat are increasingly used.

3.4.5. OTC trade confirmation

The lack of standardisation and the wide diversity of players active in the market present particular challenges as regard the broad uptake of automated trade confirmation services. Accordingly, electronic trade confirmation averages are historically lower for OTC commodity derivatives.

Among the major financial firms, electronically eligible volume as share of total trade volume has increased and now amounts to 90%. Electronic volume as share of total trade volume has also increased, amounting to 48% in March 2009.

The confirmation service provider differs depending on market segment.

Table 7: Confirmation service providers for OTC commodity derivatives

Market	Service provider
Energy	ICE e-confirm
Power and gas (Europe)	EFET
Oil, softs, coal and freight	Markit Wire (as of April 2009)
Precious metals	SWIFT

3.4.6. Risk characteristics

Compared to e.g. CDS, settlement is not triggered by a single event on the reference entity but rather depends on a multitude of factors (e.g. multiple strike prices, on different dates). The contracts therefore evolve in a more continuous nature.

Settlement is moreover often done by delivery of an underlying commodity or by cash payment calculated by a formula using objective market prices.

3.4.7. Risk mitigation

In terms of CCP clearing, as a significant share of commodity derivatives are traded on-exchange, there are a significant number of CCPs in the commodity derivatives space. The take-up of CCP clearing has been particularly prevalent in energy commodities and was to a large extent driven by the default of Enron and the increased importance attached to counterparty credit risk by other market participants.

However, most of these only cater for listed commodity derivatives. Normally, where OTC derivatives on commodities make reference to exchange traded contracts on the same underlying, they clear by the same CCP. It is estimated that 22% of OTC derivatives commodities on the same underlying of the exchange traded contracts are CCP cleared. The contracts that are eligible for clearing are typically the ones with more liquid underlying (e.g. WTI and Brent). For pure OTC derivatives, no CCP as of yet provides a CCP take up solution.

As regards trades that are not eligible for CCP clearing, as elsewhere counterparty credit exposure is managed by collateral provisioning. According to ISDA estimates, 30% of such

credit exposures in metals and energy (share of trade volume) are currently collateralised.³⁷ The relatively low level of collateralisation is primarily explained by the fact that many counterparties in commodity derivatives are non-financial firms and as such less accustomed to collateral or exempt from collateral provisioning. Moreover, collateral provisioning is complemented for physical trades that are not marked-to-market by other sorts of assurances, such as parent company guarantees, pledge of assets, prepayments or letters of credit.

Table 8: Commodity derivatives CCPs

Market	CCP
Gas	ECC, ICE Clear Europe, CME Clearport, APX
Precious metals	LCH.Clearnet, CME Clearport
Power	ECC, APX
Plastic products	LCH.Clearnet
Oil products	ICE Clear Europe, CME Clearport
Crude oil	ICE Clear Europe, CME Clearport
Coal	CME Clearport
Freight	NOS Clearing, LCH.Clearnet
Agriculture	CME Clearing, ICE Clear US, BClear
Emissions	ICE Clear Europe, NOS clearing, ECC

The diversity of market participants also affect the take up of portfolio reconciliation and compression services. For non-financial firms, the user of multilateral service providers in this area is considered less interesting.

3.5. Foreign exchange derivatives

Foreign exchange (FX) derivatives are closely intertwined with the underlying foreign exchange 'spot' market, i.e. the market where currencies change hand instantaneously. The FX market is large and mature. Overall, the further one moves from the spot to the exotic derivative part of the market, the less standardised and subject to central infrastructure the market becomes. Past focus in terms of risk management has been settlement risk; credit risk is increasingly becoming an additional focus.

3.5.1. Nature of contracts

The FX derivative market traditionally is closely interlinked with the underlying cash market. The FX market can be divided into a cash side and a derivative side. On the cash side is the outright spot market (exchange of currencies up to within two days) as well as the forward and swaps with very short maturity (e.g. two weeks). On the derivative side there are options, exotics and non-deliverable forwards and options.

An FX swap is an agreement to exchange one currency for another at a moment close in time and then reverse at a later point in time. A vanilla option gives the buyer the right to buy one currency for another at an agreed rate. There are many exotic FX options, including e.g. options that disappear if currencies trade at a certain level, options with binary payouts etc.

What unites them all is that they are used to facilitate currency risk management, payment and accounting needs of e.g. corporate, asset managers, sovereigns and speculators.

³⁷ ISDA (2009b).

Table 9: FX derivative contracts traded on and off-exchange

Notional amounts outstanding, USDbn, December 2008

	\$bn
OTC	
Forwards and forex swaps	24,562
Currency swaps	14,725
Options	10,466
On exchange	
Currency futures	102
Currency options	126

Source: BIS (2009).

3.5.2. Market structure

The FX market is concentrated in terms of products. For example, the top three currencies account for close to 80% of market. However, the market is diverse in terms of participation. While naturally the global market making dealers are important, there are thousands of participants in the FX market.

Europe is the location of choice for the global FX market, accounting for 57% of the global market turnover.³⁸ The majority is traded out of the City of London.

Traditionally, the FX derivative market has been characterised by large sized trades (large notional / small amount of transactions). However, volumes have picked up in recent years and have been further amplified during crisis. They are likely to increase further, as retail investors become more active and algorithmic trading – enabled by electronic trading – takes off. Even so, that development is likely to be more pronounced for the more standardised cash side of the FX market as well as the vanilla side of the derivatives than for the more exotic part of the market.

The FX market is nearly solely conducted OTC, which stands for 95% of notional and 90% of tickets. The exchange part is predominantly traded on the CME in the US.

3.5.3. Market infrastructure

The infrastructure differs depending on the segment of the market.

- **Trade execution:** In terms of trading, the FX market trades in three segments, some of which are very exchange-like: (i) the voice market, where counterparties negotiate directly, (ii) the electronic inter-dealer market (e.g. EBS/ICAP and Reuters for spots, TFS-ICAP for FX options), and (iii) the electronic dealer to client market, where trades are conducted on Electronic Communication Networks (ECNs, e.g. Currenex). The switch to electronic trading has occurred during the last five years and is particularly prevalent for the spot market, as the electronic trade channels cater significantly less well for contracts with bespoke maturities. For the derivatives part, the trade channel of choice remains voice brokerage.
- **Trade confirmation:** electronic confirmation is done via SWIFT since 1977. SWIFT offers both confirmation and payment messaging.

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BIS (2007)

Overall, there is a strong incentive to automate as much as possible, as margins are limited and the business is based on volume. As the derivative side of the market becomes increasingly commoditised, it becomes more amenable to electronic execution, affirmation and confirmation.

3.5.4. Market standardisation

FX products are easy to define. There is industry agreement on market definition of all products' characteristics, including half of the more exotic products. The market is accordingly standardised in terms of contract specifications. Moreover, the big institutions typically trade out of one jurisdiction (predominantly London) thereby centralising their OTC FX business on one type of contract (ISDA MCA, English law).

As regards market technology standards, as outlined above electronic confirmation is the norm for the cash side of the market. For vanilla derivatives, there is an incentive to automate in order to reduce ticket costs, but further efforts from the industry are necessary in that area.

3.5.5. Counterparty risks characteristics

The predominant risk in FX markets is cross-currency settlement risk, i.e. the risk that a settlement does not take place as expected. This may happen because one party defaults on its clearing obligations. This risk is particularly prevalent in FX, which is a global market where participants operate in different time zones and where it takes time to settle obligations and where the working hours of inter-bank payment and settlement systems may not overlap. In such situations, the failure of one counterparty to settle its side of a deal may trigger a chain reaction of cross-defaults.

These risks are often called Herstatt risk after a small German bank (Bankhaus Herstatt), which defaulted in 1974 during the period it was supposed to settle a contract after having received the payment from the counterparty. Herstatt's default caused a cascade of rapid defaults, totalling a loss of \$620 million. Since then, similar defaults have involved Drexel Burnham Lambert in 1990, Bank of Credit and Commerce International in 1991 and Barings in 1995.

However, while settlement risk may be the most high-profile risk, it is only one part of the risk exposure of FX counterparties. Settlement is actually only one, albeit important (as the entire notional amount is at stake), part of a derivative contract, where positions are open for some time and the residual value of the contract evolves during which time, which exposes counterparties to more traditional credit risk. Depending on the maturity of the FX derivative contract, counterparties face more or less counterparty credit risk exposure. However, two factors mitigate this risk in certain FX derivative transactions. First, the average maturity of FX derivative contracts are short (less than three months), hence limiting the counterparty credit risk. Second, the market is deep and liquid, which a priori facilitates replacing a particular contract should the counterparty default.

3.5.6. Risk management

To deal with cross-currency settlement risk, market participants are using the Continuous Linked Settlement System (CLS). Founded in 1997 and operational since 2002, CLS is special purpose bank that provides continuous linked settlement services that simultaneously settles both payments under a FX transaction. It is operated by CLS Bank International, based in New York and owned by the major banks in the FX market. It is supervised by the Federal Reserve Bank of New York. It is designated by the Bank of England for the purposes of the UK legislation that implements the Settlement Finality Directive (SFD) and it is notified to

the Commission under Article 10(1) of the SFD. CLS Bank's rules are governed by English law.

CLS consolidates positions across the FX market and multilaterally nets payments of gross value instructions based on value date. CLS settles matched trades on a payment vs. payment basis across 17 currencies. Netting rates for payments amount to 98%. CLS also facilitates premium payments arising during the maturity of a contract.

There are limits to CLS in terms of scope:

- In terms of *material* scope, for a currency to be eligible for CLS settlement requires approval by the Central Bank of the currency in question as well as this currency to have a Real-Time Gross Settlement system (RTGS).
- In terms of *personal* scope, the counterparty to the FX transaction has to be able to connect to CLS. As regards the latter, there are three categories of CLS users: shareholders and Member Banks (60) and third party users (roughly 4,600). This last category has expanded rapidly in recent years. Third party users are indirect participants to CLS, effectively using one of the Settlement Member Banks as their way into CLS. These third party users are known to CLS.

In view of the above limits, CLS is currently used for 55% of FX transactions (90% of the interbank market) with the remaining 45% remaining bilaterally settled. To improve the rate of usage requires expanding (i) the scope of services (e.g. expanding the settlement cycle in terms of time), (ii) the scope of currencies, and (iii) the scope of membership.

For non-CLS transactions, the process remains manual (confirm trade, confirm standard payment instructions, agree amount, net against other instructions if applicable).

The benefits of CLS were illustrated during autumn 2008. All transactions related to Lehman were in CLS and hence were protected (even though Lehman was not a direct bank member of CLS, but was using Citi). When the problems emerged with the Icelandic banks, some transaction fell outside CLS, which accordingly generated losses.

As regards credit risk, it can either be addressed by bilateral collateral management or introducing a CCP. As regards the former, ISDA estimates that 36% of exposures as share of trade volume are currently collateralised.³⁹ The low rate is explained by corporate and fund managers that typically do not provide collateral. While the major dealers mark-to-market and collateralise on a T+2 basis, other market participants may collateralise less frequently.

A CCP would be response to the credit risk. However, CLS perform some functions traditionally performed by CCPs (e.g. multilateral netting). Moreover, as CCPs novate trades, they tend to work with aggregate positions as regards settlement instructions. This may not be compatible with CLS' current business model. In view of these and other issues, there has so far not been any appetite, on the side of market making dealers, for introducing a CCP in the FX market. One such project saw the day some years ago (a joint venture between CME and Reuters, which connected to CLS) but failed to take off. However, in view of the increase in trade volumes, the increasing use of ECNs and the increasing focus on remaining credit risk, views on the relative merits of a CCP may evolve.

³⁹ ISDA (2009b).

4. EFFECTIVENESS OF CURRENT RISK MITIGATION MEASURES

This chapter looks at the effectiveness of current risk mitigation measures, namely CCP use, in addressing the general risks associated with OTC derivatives and the specific risks associated with each market segment, detailed in previous chapters.

4.1. Credit default swaps

Credit default swaps have been the focus of particular attention for a number of years in view of the explosive growth of the market. This focus has strengthened with the role played by CDS in the events of September 2008.

As outlined above, CDS have particular risks (e.g. discontinuous pay-out structure, concentrated market structure, derivative market much larger than the underlying market, problems of valuing the underlying risk in stressed market circumstances) all of which are difficult to mitigate. Among these, another important characteristic is the lack of standardisation in the contracts and procedures following a credit event.

For all these reasons, CCP clearing is desirable. To allow CCP clearing, important developments outlined above have taken place following the industry commitment to move to CCP clearing.

The letter of commitment states that the signatories will start clearing eligible CDS on European reference entities and indices on these entities through one or more European CCPs by 31 July 2009. The Commission services consider that the industry is putting in considerable efforts in trying to meet the deadline stated in its commitment. Indeed, industry initiatives have so far proved to be effective on both sides of the Atlantic as far as the standardisation of CDS is concerned. However, the most critical issue for the clearing of European CDS, i.e. the restructuring credit event, has not been solved yet.

The European CCPs currently proposing services for CDS clearing differ in the time to market:

- Bclear is already operational for CDS indices (iTraxx Europe), but until now no trade has been cleared. No definitive date has been provided for the extension to single names CDS, which would require a separate regulatory approval process and a separate segment of the default fund. It has also recently announced its intention not to make any further investment into the project at this stage.
- Eurex Clearing has announced that it will be ready (pending regulatory approval) to clear both CDS indices (iTraxx Europe) and single names (components of most liquid indices) before the end of July 2009.
- ICE Clear Europe, subject to regulatory approval, its initial offering expected before the end of July 2009 should cover indices and may also cover a selected list of single names. Once single names will be added to the offering, the one originated from a restructuring credit event on an index component, will be included in the list of the cleared single name contracts.
- LCH.Clearnet SA is expected to be ready to offer its services starting from December 2009.

Overall, as of today, it is too early to judge whether the dealers' efforts will be enough to respect the commitment to clear eligible European CDS by 31 July 2009. Given the threat to financial stability, if it was not respected, other ways to reach the same objective would have to be found.

4.2. Interest rate swaps

The interest rate derivatives market is the biggest in terms of size. It is also the most mature in terms of market infrastructure, notably by the presence of a well-established CCP; SwapClear. This infrastructure successfully mitigates the risks encountered in interest rate derivative markets. This is particularly the case, as these risks are less dramatic and more easily mitigated than the risks associated with CDS.

The solidity of that infrastructure was demonstrated when SwapClear's Default Management Group successfully unwound the risk related to open trades subsequent to the default of Lehman Brothers. Overall the vast majority of IRS contracts are eligible to clear on a CCP. The exception would be the more exotic contracts, which currently amount to around one third of the market. It is, therefore, worth considering expanding the scope of CCP clearing scope further in three respects, provided that regulatory and supervisory objectives continue to be met:

- **Extending the scope of products:** in terms of e.g. cross-currency trades, basis trades, currencies included and maturity.
- **Extending direct participation in SwapClear:** Another limitation to the level of clearing is the number of counterparties that are General Clearing Members (GCMs) of SwapClear. If the number of GCMs was extended, a higher share of the market would become CCP cleared⁴⁰. However, there are limits and trade-offs related to extending participation. Not all dealers can become GCMs, as it comes with strict obligations in terms of ability to shoulder a part of the default management burden. That requires ability to process and value significant portfolios in a short time span.
- **Offering CCP clearing to GCM clients:** SwapClear has recently announced its intention to offer clearing services to clients of GCMs enabling them to benefit from CCP clearing.⁴¹ This could bring a significant additional share of the market onto SwapClear.

4.3. Equity derivatives

The equity derivative market is significantly smaller than most of its OTC derivatives peers. Moreover, some of its inherent characteristics – e.g. continuous pay-out structure, presence of an objective market price for risk valuation purposes even under stressed market circumstances – limit the amount of systemic risk potentially triggered by this segment.

Even so, the equity derivative markets are associated with other characteristics that may contribute to risk. First, there is a lack of standardisation. For example, standard contractual documentation differs depending on region and sometimes countries. Moreover, the uptake of electronic trade confirmation remains limited. While part of this lack of standardisation is due to the inherent divergences in the underlying cash equity markets, it would nevertheless be desirable to address the major differences in the contractual underpinnings of equity derivatives as well as achieving a higher degree of electronic take up.

Moreover, while CCP services exist for OTC equity derivatives, the take up is so far very limited. Accordingly, it is necessary to assess ways of further promoting the take-up of CCP services. Moreover, it is necessary to further assess the ability of existing infrastructures to connect to and channelling trade flows to a CCP. The bilateral clearing model could also be

⁴⁰ On 18 May 2009 three new banks (ING Bank NV, Natixis SA and Rabobank NV) became Swapclear members.

⁴¹ LCH.Clearnet (2009).

further strengthened, as the level of credit exposures covered by collateral remain well below the average for OTC derivatives as a whole.

4.4. Commodity derivatives

Commodity derivatives are extremely varied and diverse. The market structure differs depending on segment, with some being more standardised and subject to CCP clearing, with others being pure OTC. The diversity of the various market segments and the broad range of actors involved reduce the amount of systemic risk but make it difficult to gather centralised market information and equally present challenges in terms of standardisation.

As regards clearing, many CCP clearing houses are in place, but predominantly cater for listed commodity derivatives. There are inherent limitations to CCP uptake in markets as diverse as commodities and bilateral clearing can accordingly be expected to continue and even extend as regards coverage.

However, achieving more stability and transparency in commodity derivatives requires developments outside the post-trade area as well. A significant number of participants in these markets are not financial firms, but commercial producers hedging their price risks. Therefore, legislation designed for the financial sector may not be adequately tailored to their activity and risk profile. Indeed, this is reflected in a number of exemptions from EU financial legislation, such as MiFID and CRD. Ensuring access of such firms to commodity derivative markets is important as it supports building competition within the recently liberalised EU commodity markets (e.g. electricity and gas). It also contributes to market liquidity.

While regulation aimed at financial players may not be appropriate for commercial firms, various provisions in recently adopted EU energy and emissions market legislation signals the need to converge key aspects of the regulation of some physical commodity markets and financial commodity derivative markets.⁴² There is a growing consensus that the efficiency, and better oversight, of various commodity markets could be improved with the formulation of dedicated EU-wide, sector-specific rules on, for example, market abuse and transparency of trading activity. The Committee of European Securities Regulators (CESR) and the European Regulators' Group for Electricity and Gas (ERGEG) have recently delivered advice to this effect to the Commission.⁴³

4.5. Foreign exchange derivatives

The FX derivative market – closely intertwined with the underlying spot market – is large mature and systemically important. Since 2002, the FX derivative market is using CLS, a payment system notified by the United Kingdom under the Settlement Finality Directive (SFD), which has significantly reduced the systemic risk associated with FX. Other characteristics of the FX derivative market also attenuate the systemic risk, e.g. extremely liquid market, a relatively high degree of standardisation, dispersed market structure.

However, so far only 55% of the FX derivative market is covered by CLS (90% of the interbank market). It would therefore be desirable that CLS uptake broadens further by (i)

⁴² See Article 12 of the revised Emissions Trading Scheme directive, and Articles 22f/24f and Recitals 20/22, as amended, of the Third Legislative Package for Gas and Electricity Markets amending Directives 2003/54/EC and 2003/55/EC (<http://register.consilium.europa.eu/pdf/en/08/st03/st03737.en08.pdf>, http://ec.europa.eu/energy/gas_electricity/third_legislative_package_en.htm).

⁴³ See CESR and ERGEG (2009a and b).

expanding the set of currencies covered, (ii) broadening the range of participants that can connect to it, and (iii) expanding the settlement cycle.

In addition, while settlement risk may be the most important risk in FX derivative market, credit risk remains. So far, no CCP provides services in this area due to market participants' views that credit risk is not as important in this segment as in others. Even so, one needs to consider what the rapid expansion of electronic trading in general and algorithmic trading in particular, plus the new type of counterparties coming to the market imply for the level of risk. There are, therefore, good reasons for market participants to actively consider ways of addressing credit risk as well as settlement risk.

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GLOSSARY⁴⁴

Affirmation (of a trade confirmation)	A procedure in a confirmation process, whereby a single record of the trade is created by one party evidencing the full terms of the trade and the counterparty verifies and agrees to that record. Affirmation of trade confirmations is different from trade verification (also known as economic affirmation), which is limited to principal economic terms
Arbitrage	The exploitation of price differences in connected markets.
Basis point	0,01 of a percent. 100 basis points equal 1 percent.
Bid-ask spread	The difference in price between the highest price that a buyer is willing to pay for an asset and the lowest price for which a seller is willing to sell it.
Central counterparty (CCP)	An entity that interposes itself between the counterparties to the contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer.
Clearing	The process of establishing settlement positions, including the calculation of net positions, and the process of checking that securities, cash or both are available. In other words it is the process used for managing the risk of ⇒ open positions.
Collateral	An asset or third-party commitment that is used by the collateral provider to secure an obligation to the collateral taker. Collateral arrangements may take different legal forms; collateral may be obtained using the method of title transfer or pledge. See also margin.
Confirmation	A document identifying the details of a trade and any governing legal documentation, as agreed upon by both parties. This document serves as the final record of the transaction
Confirmation process	The process by which trade details are verified with a counterparty, with a view to obtaining a final record of the trade. This is generally done by exchanging a confirmation proposal via fax, mail or an electronic

⁴⁴ This glossary draws partly on glossaries contained in various reports published by Committee on Payment and Settlement Systems of the Bank for International Settlements.

	confirmation service. Either one party provides trade details and the other then verifies the information, or both parties submit records of the trade and verify each other's records.
Counterparty credit risk	The risk that a counterparty will not settle an obligation for full value, either when due or at any time thereafter. Credit risk includes pre-settlement risk (replacement cost risk) and settlement risk (principal risk).
Coupon	The regular payment on a contract, often also referred to as premium or \Rightarrow spread. The coupon can be fixed or floating.
Credit event	An event that may trigger the exercise of a CDS contract. Credit events include, for example, failure to pay (interest or principal when due), bankruptcy or \Rightarrow restructuring.
Default fund	A fund composed of assets contributed by a CCP's participants that may be used by the \Rightarrow CCP in certain circumstances to cover losses and liquidity pressures resulting from defaults by the CCP's participants. Also known as clearing fund.
Exposure	The amount of funds at risk, i.e. the amount that one may lose in an investment.
Hedge	A \Rightarrow position established in one market in an attempt to offset \Rightarrow exposure to the risk of an equal but opposite obligation or position in another market.
Leverage	A financial ratio that compares some form of owner's equity (or capital) to borrowed funds. The higher are the borrowed funds with respect to own capital, the higher is the leverage.
Margin	An asset (or third-party commitment) that is accepted by a counterparty to ensure performance on potential obligations to it or cover market movements on unsettled transactions.
Marking to market	The practice of revaluating open positions in financial instruments at current market prices and the calculation of any gains or losses that have occurred since the last valuation.
Master Agreement	An agreement that sets forth the standard terms and conditions applicable to all or a defined subset of transactions that the parties may enter into from time

	to time, including the terms and conditions for closeout netting.
Multi-lateral netting	Netting on a multilateral basis by summing each participant's bilateral net positions with the other participants to arrive at a multilateral net position. Such netting is often conducted through a central counterparty (but it can also be done by other entities). In such cases the multilateral net position represents the bilateral net position between each participant and the central counterparty.
Multi-lateral trading facility (MTF)	A multilateral system, operated by an investment firm or a market operator, which brings together multiple third-party buying and selling interests in financial instruments - in the system and in accordance with non-discretionary rules - in a way that results in a contract.
Netting	The offsetting of positions or obligations by counterparties.
Notional amount	The reference amount on which a derivative contract is written.
Novation	The replacement of a contract between two initial counterparties to a contract (the transferor, who steps out of the deal, and the remaining party) with a new contract between the remaining party and a third party (the transferee).
Open interest	The total number of open derivative contracts on a specific underlying.
Par value	The stated, nominal or face value of a security.
Plain vanilla transactions	Generally used to refer to a type of derivatives transaction with simple, common terms that can be processed electronically. Transactions that have unusual or less common features are often referred to as exotic, structured or bespoke.
Portfolio reconciliation	The process of verifying the existence of all outstanding trades with a particular counterparty and comparison of their principal economic terms.
Portfolio compression	⇒ Multi-lateral netting.
Position	The stance an investor takes vis-à-vis the market. An investor's position is said to be long (short) when she buys (sells) a financial instrument.

Reference entity	A corporate, a sovereign or any other form of legal entity which has incurred debt, on which a CDS is written.
Restructuring	One of the ⇒ credit events that may trigger the exercise of a CDS contract. The term denotes a change in the legal terms of an issuer's (⇒ reference entity) obligation, such as the reduction in the obligation principal, the reduction in the contractually agreed interest payments and the deferral of interest or principal payments.
Settlement	The completion of a transaction, wherein the seller transfers securities or financial instruments to the buyer and the buyer transfers money to the seller.
Speculation	The act of making an investment, i.e. taking a ⇒ position in the market, without certainty of being able to recover the initial investment or earning a return on the investment.
Spread (of a CDS)	The ⇒ coupon of a CDS contract expressed as a percentage of the notional amount. For example, a spread of 400 ⇒ basis points for a five-year CDS with a notional amount of €10m implies a payment of €400.000 per year, or €100.000 per quarter, as payments are made quarterly. The spreads reflects the probability of default of a reference entity: the higher the spread, the higher the probability of default.
Trade matching	The process by which both counterparties to a trade create a written or electronic record evidencing the full terms of the trade. These two records are then compared and considered matched if they are identical.