



EUROPEAN CENTRAL BANK

EUROSYSTEM

CREDIT DEFAULT SWAPS AND COUNTERPARTY RISK

AUGUST 2009

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I EXECUTIVE SUMMARY

The ongoing financial market turmoil has highlighted the importance of counterparty risk in the over-the-counter (OTC) derivative markets. The role played by credit default swaps (CDSs) has been the subject of lively debate, with some commentators claiming that the CDS market has increased financial contagion or even proposing an outright ban on these instruments.

CDSs are derivative instruments which enable market participants to transfer or redistribute credit risk. For example, a bank can buy CDS protection to protect itself against a default by a CDS reference entity. Given the relatively liquid nature of the CDS market, it is also a useful source of information on the price of credit under normal circumstances. However, to an outside observer, the size of the CDS market, combined with its structural opacity, concentration and interconnectedness, may be a sign that the CDS market also poses a systemic risk to financial market stability. Given the international nature of the CDS market, these aspects could usefully be considered from a global perspective. This Banking Supervision Committee (BSC) report aims to provide an assessment, at the EU level, of the sources of counterparty risk and related challenges. Areas that deserve particular attention by public authorities and market participants will also be highlighted.

The CDS market is relatively small by comparison with other OTC instruments (accounting for less than 7% of the OTC market in terms of notional amounts), despite experiencing very considerable growth over the last few years. Recent BIS statistics place the notional value of CDS contracts outstanding in December 2008 at over USD 41 trillion. The net mark-to-market exposure, which represents the true counterparty risk in the CDS market (taking into account the netting of multiple trades between pairs of counterparties and the relevant collateralisation) is probably a fraction of this amount, but still difficult to quantify with available data.

Being an unregulated market, CDSs have always been opaque credit risk transfer instruments, and

their effective contribution to risk dispersion has always been difficult to measure and assess. Statistics on CDS volumes have recently improved following the release of more detailed statistics by a service provider in the CDS market in November 2008. However, the available data remain only loosely related to the actual credit risk and still do not provide any indication of individual counterparty risk exposures. Assessing CDS-related counterparty risk in the EU has therefore proved to be very challenging owing to the lack of information on the market value of CDS positions, on the identity of counterparties or on collateral practices (including the extent of collateralisation).

In this regard, this report has benefited greatly from the availability of a unique set of data, in particular data made available by 31 of the largest European financial institutions in response to an ad hoc qualitative and quantitative survey. Drawing on these data, the report sets out four main features of the CDS market in the EU that deserve attention for financial stability purposes.

- First, the CDS market remains highly concentrated in the hands of a small group of dealers, which is European banks' main concern as regards CDS counterparty risk. In Europe, the top ten counterparts of each surveyed large bank account for 62-72% of its CDS exposures (when measured in terms of gross market value). In addition, the concentration of the CDS market is now higher than it was before the crisis, since some major players – for instance dealers (e.g. Bear Stearns, Lehman Brothers and Merrill Lynch), or counterparties that used to be sellers of protection, such as monolines, credit derivative product companies (CDPCs) and hedge funds – have exited the market. This concentration has increased the liquidity risk in the event of another dealer failure. Market participants have also indicated concerns regarding the relative scarcity of sellers.
- Second, the interconnected nature of the CDS market, with dealers being tied to each

other through chains of OTC derivative contracts, results in increased contagion risk. In practice, the transfer of risk through CDS trades has proven to be limited, as the major players in the CDS market trade among themselves and increasingly guarantee risks for financial reference entities.

Another finding is that, on the basis of the data provided by a CDS market provider, euro area banks are currently net sellers of CDSs, although the net amount of protection sold is relatively small and relates to the reference point in time for which this data was collected (April 2009). This contrasts with the traditional net buyer position indicated by BIS data.

The “risk circularity” within the CDS market may be a concern for financial stability, as banks may be replacing one type of risk (i.e. credit risk) with another – counterparty risk.

- Third, CDSs are widely – and increasingly – used as price indicators for other markets, including loan, credit and even equity markets. Thus, these instruments are playing a broader role in the determination of prices.

On the loan market, CDSs may have an impact on access to credit and the cost of funding, as they are now widely used by larger banks for active credit portfolio management. Some financial institutions have CDS premium-dependent pricing guidelines for new loans, while some credit rating agencies may place greater emphasis on the price discovery function of CDSs by actively offering market-implied ratings. In the cash bond market, investors are increasingly using CDSs as an indicator for their investment decisions.

The equity and CDS markets have also become more interlinked where CDS price movements have a feedback effect on the equity market. Indeed, a trading strategy commonly employed by banks and other market participants consists of selling a CDS on a reference entity and hedging the resulting credit exposure by shorting the stock. While linkages and circular feedback effects on the underlying reference entities cannot be ruled

out, comprehensive empirical studies have not yet been undertaken to determine the strength or otherwise of those links.

Although the CDS market may be a useful source of price information in normal market conditions, its reliability for pricing purposes in times of distress has recently been questioned. Given its properties as an OTC market, it is particularly difficult to conclusively assess the liquidity in the various CDS market segments.

- Fourth and finally, the report also highlights the risk factors related to the significant widening observed in sovereign CDS spreads in mid-March 2009. Given that sovereign CDS spreads are, in most circumstances, also viewed as lower limits for the corporations of those countries, further research is warranted to assess the causes of these developments. The potential policy implications in terms of the impact that these exceptional CDS spreads could have on the credit ratings of sovereign governments in illiquid environments and the possibility of negative feedback loops would thus seem to warrant further research for financial stability monitoring purposes. This applies in particular to the liquidity of this market for the purpose of ensuring market integrity.

The report also provides an overview of a number of regulatory and market initiatives that are under way with a view to addressing these weaknesses, including details of the latest EU consultation for OTC derivatives (including CDSs), and reviews the various initiatives to establish central counterparty clearing houses (CCPs) for CDSs.

The potential systemic importance of CCPs was mentioned by the Governing Council of the ECB on 27 September 2001.¹ The importance of CCPs was then confirmed on 18 December 2008, when the Governing Council stated that there was a need for at least one European CCP for credit derivatives.²

1 http://www.ecb.int/press/pr/date/2001/html/pr010927_2.en.html

2 <http://www.ecb.int/press/govcdec/otherdec/2008/html/ge081219.en.html>

The importance of the CDS market and the related risks were also highlighted by the European Commission in a staff report published in July 2009.³

On the basis of these main findings, the report highlights a number of areas that may need to be considered by the regulators. Above all, greater disclosure and transparency is required for the assessment of systemic risk. Aggregate data on market volumes have improved, mainly thanks to the release of CDS statistics by a market service provider. However, from a systemic risk management perspective, improvements would be desirable in a number of areas.

- First, extended disclosure on counterparty risk would be useful, including indicators of counterparty concentration exposure, both for individual institutions and for the market as a whole.
- Second, the differences between the major data sources in terms of their data coverage and methodologies should be bridged to allow market participants and regulators to obtain and benefit from a broad and consistent market overview.
- Third, improvements could also be made in terms of public disclosure. The most active institutions could regularly disclose their total gross notional amounts and gross market values for bought and sold CDS, as well as net market values for uncollateralised derivative transactions. That information could also be provided for these institutions' largest counterparty positions and could be disclosed in their financial statements.
- Fourth, information regarding CDS prices remains a challenge for non-dealer market participants. Increased transparency with regard to turnover volumes for trades – for instance aggregated daily turnover volumes – is desirable for both non-dealer market participants and regulators.

Given the influence that CDS spreads may have on credit markets and equity markets, combined with the possibility of related negative feedback effects, further research is warranted for financial stability monitoring purposes. This concerns a number of areas, such as the role of CDSs in the cost of firms' funding and the role of CDSs in corporate and EU government bond markets, as well as the overall EU sovereign CDS market. Additional areas for further study include the linkages between the equity and credit markets before and during the crisis, the role played by CDSs in changes in credit ratings and the drivers of the recovery rates seen in ISDA auctions for European reference entities.

Finally, the establishment of CCPs for CDSs is now the focus of regulatory attention. Given the considerable extent to which counterparty risk is concentrated in CCPs and the importance of CCPs for financial stability, it is vital that CCPs operate under appropriate supervisory oversight to ensure that they have sound corporate governance and robust risk management practices. On 16 July 2009 the Governing Council of the ECB also reaffirmed the systemic importance of securities clearing and settlement systems and welcomed the progress made towards the introduction of central counterparty clearing facilities for OTC credit derivatives. In line with its decision of 18 December 2008 and its earlier statement of September 2001 on central counterparty clearing, the Governing Council also confirmed the importance of having at least one CCP clearing facility for OTC credit derivatives located within the euro area. In this context, particular priority will be given to the use of euro area infrastructures for clearing credit default swaps denominated in euro, which will be closely monitored by the Eurosystem in the coming months.⁴

³ "Ensuring efficient, safe and sound derivatives markets", European Commission, COM (2009) 332, 3 July 2009.

⁴ <http://www.ecb.int/press/govdec/otherdec/2009/html/gc090717.en.html>

2 INTRODUCTION

The ongoing financial market turmoil has highlighted the importance of counterparty risk in the over-the-counter (OTC) derivative markets, as shown by the acute difficulties experienced by major dealers and other market participants, such as Bear Stearns, Lehman Brothers and AIG. These cases have highlighted the typically opaque linkages within the OTC markets, which have created a situation where market participants may be too big or interconnected to fail. In the light of these recent developments, this report aims to assess the counterparty risk and the main related risks faced by European market participants that are active within and exposed to the credit default swap (CDS) market.

This report will first provide an overview of the various CDS markets, looking at: the main CDS products and their use; historical developments; the main players; and the structure of the market.

The second chapter will outline sources of counterparty risk for CDS instruments, discussing the following specific risks: wrong-way risk; jump-to-default risk; liquidity risk; concentration risk; and systemic risk. A broad assessment of current exposure to counterparty risk in Europe has been undertaken, building on data which have not been publicly available in the past. In addition, the materialisation of the various types of counterparty risk will be described in relation to the failures of AIG and Lehman Brothers.

The report will then assess the use of CDSs for hedging or trading purposes, before turning to the impact that CDSs have on the real economy via the cost of funding and access to credit. The use of CDSs as leading indicators during the current crisis will then be reviewed, since CDSs are frequently referred to as barometers for the pricing of risk and are increasingly having an impact on the financing costs of both corporations and governments.

The report will conclude with a review of current market initiatives and regulatory initiatives for the CDS market following the outbreak of the crisis and the failure of Lehman Brothers in particular.

This report has been based on three datasets: national BIS data on credit derivatives; Depository Trust and Clearing Corporation (DTCC) data on CDSs taken from its Trade Information Warehouse (TIW); and a qualitative and quantitative survey of European banks active within the CDS market. Three workshops were also held in Frankfurt and London to collect the views of CDS dealer banks, various market providers, and the rating agencies Fitch, Standard & Poor's and Moody's, as well as the independent research company CreditSights and the legal firms Freshfields and Linklaters. Leading academic experts also contributed to this report with regard to various aspects of systemic risk within the CDS market.⁵ The workshops were complemented by a number of interviews with market participants on a bilateral basis.

The national BIS data analysed for this report were historical annual aggregated data on credit derivatives provided by five countries (France, Germany, Italy, the Netherlands and the United Kingdom; henceforth the "EU5") for the last five years, as well as disaggregated BIS data compiled by individual institutions. This may be the first time that these disaggregated BIS data have been used for a study of this market at EU level.⁶ The BIS data show notional figures and gross market values for bought, sold and outstanding amounts of CDSs, broken down by counterparty sector. This allowed an assessment of the market's concentration, as well as a cross-country sectoral breakdown by counterpart (e.g. insurance companies or hedge funds).

⁵ Prof D. Duffie (Stanford University), Prof R. Cont (Columbia University).

⁶ See also <http://www.ecb.int/pub/pdf/other/creditrisktransfer200405en.pdf>

The BIS Working Group on Credit Risk Transfer, of which the ECB is a member, was established in 2009 in order to look at how BIS data on CDSs – and credit risk transfer in general – collected under the auspices of the CGFS could be enhanced. One area in which the ECB has strived to improve the current data coverage has been the geographical coverage of risk. This allowed a customised set of euro area CDS statistics to be extracted from the DTCC's Trade Information Warehouse database, providing a snapshot of the notional amounts of CDSs bought and sold by euro area entities, as well as details of gross and net notional outstanding amounts and the number of CDS contracts referencing euro area entities. In addition, for the purposes of this report, the DTCC measured the level of concentration among the top ten and the top five dealers within the global CDS market and the amount of wrong-way risk.

A quantitative and qualitative survey was also sent to 31 banks in seven countries (France, Belgium, Germany, Italy, the Netherlands, the United Kingdom and Spain). This measured – for the first time – the amount of counterparty concentration at the level of individual banks, as well as the amount of collateralised OTC derivative exposures and notional amounts and market values for CDSs bought and sold as at the end of December 2008.

The qualitative questionnaire was also circulated to Fitch, Standard & Poor's, Moody's and CreditSights in order to obtain the views of banks and external credit analysts as regards the main concerns and issues in the CDS market.

3 CDS MARKET OVERVIEW

3.1 WHAT ARE CDSs AND HOW ARE THEY USED?

CDSs are a product within the credit derivative asset class, constituting a type of OTC derivative. They are bilateral contracts in which a protection buyer agrees to pay a periodic fee (called a “premium”) and/or an upfront payment in exchange for a payment by the protection seller in the case of a credit event (such as a bankruptcy) affecting a reference entity or a portfolio of reference entities such as a CDS index (see Chart 3.1).⁷ The market price of the premium is therefore an indication of the perceived risk related to the reference entity.

There are three main types of CDS (see Table 3.1). First, the “single-name CDS” offers protection for a single corporate or sovereign reference entity.

Second, CDS indices are contracts which consist of a pool of single-name CDSs, whereby each entity has an equal share of the notional amount within the index. The standardisation and transparency of indices has contributed strongly

Table 3.1 Three main types of CDS

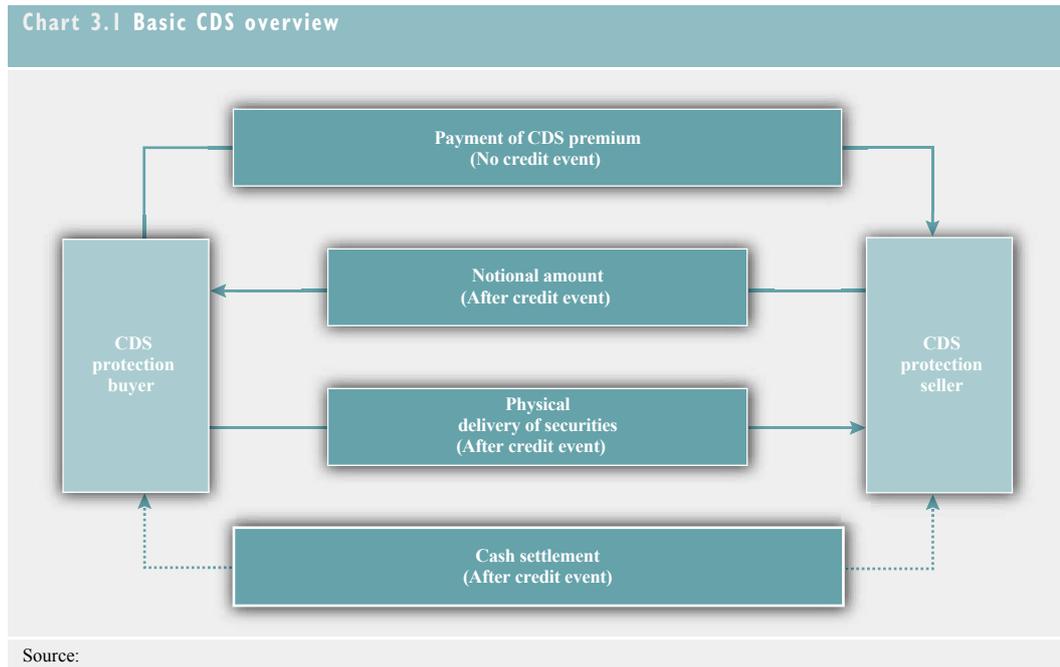
Single Name	The reference entity is an individual corporation, bank, or government.
Index	CDS referring to multiple constituent entities in the index with each entity having an equal share of the notional amount. The degree of standardisation is highest for these contracts.
Basket CDS	CDS with more than one reference entity (typically between three and one hundred names). Specific types include first-to-default CDS, full basket CDS, untranching basket and tranching basket known as a synthetic CDO.

to the growth of index contracts.⁸ In June 2009 this segment accounted for almost half of all CDS contracts in terms of notional outstanding amounts, compared with virtually nil in 2004. Liquidity for benchmark indices is enhanced by including only the most liquid single-name CDSs. Market participants have come to view the CDS indices as a key source of price

7 The ISDA 2003 definition of “credit event” covers “bankruptcy”, “failure to pay”, “restructuring”, “obligation acceleration”, “obligation default” and “repudiation/moratorium”.

8 D. Duffie, (2007), Innovations in credit risk transfer: Implications for Financial Stability, Stanford University.

Chart 3.1 Basic CDS overview



Source:

information. Official prices for these indices are collected by Markit and published on a daily basis. CDS indices do not cease to exist after credit events, instead continuing to trade with reduced notional amounts.

In addition, a market has also developed for CDS index tranches, whereby CDS contracts relate to specific tranches (also known as “synthetic CDOs”) within an established CDS index. Each tranche covers a certain segment of the losses distributed for the underlying CDS index as a result of credit events. For example, in the case of the iTraxx index, the lowest tranche – the equity tranche – absorbs the first 3% of losses on the index. CDS index tranches are thus mainly instruments to trade the correlation between the default times of the constituent parts of the index.

Third, basket CDSs are similar to indices, as they relate to portfolios of reference entities, which can comprise anything from 3 to 100 names. However, basket CDSs may be more tailored than index contracts and are more opaque in terms of their volumes and pricing. Basket CDSs, for example, include specific sub-categories such as first-to-default CDSs (where investors are exposed to the first default to occur within the basket of reference entities). In addition, derivative instruments such as CDS options (called “CDS swaptions”) are now also being traded. Holders of these instruments are entitled – but not obliged – to enter into forward-start CDS contracts to buy or sell protection. This type of instrument may benefit from increased investor interest in the environment of increased transparency that may result from stronger migration of CDSs to CCPs.

It is important to distinguish between standard single-name CDSs or index contracts and the more complex bespoke CDS contracts, as the latter can be very different (having, among other things, different degrees of liquidity and embedded leverage) and are frequently used for different purposes.

Although disentangling the various uses of CDSs is somewhat artificial, one approach has

Table 3.2 CDS Markit indices

CDX (US)	Most liquid baskets of names covering North American Investment Grade, High Yield, and Emerging Markets single name credit default swaps.
iTraxx	Most liquid baskets of names covering Europe, Asia, Australia and Japan.
LCDX (US)	North American benchmark for first lien leverage loan CDS. 100 reference entities, referencing 1 st lien loans listed on the Syndicated Secured List.
LevX	European benchmark for leveraged loans CDS. They are constructed from the universe of European corporates with leveraged loan exposures.
ABX (US)	The 20 most liquid CDS on US home equity ABS. The ABX.HE index is used by banks and asset managers that want to hedge asset-backed exposure or take a position in this asset class.
CMBX (US)	A synthetic index referencing 25 commercial mortgage-backed securities. The CMBX Indices were created in response to the rapid pace of growth in the CDS of CMBS market, providing investors with a standardized tool to gain exposure to this asset class.
MCDX (US)	These indices refer to U.S. municipal credits covering revenue and general obligations.
SovX	Family of sovereign CDS indices covering countries across the globe.

Source: Markit.

been to distinguish between CDSs for *hedging* and *trading* purposes.⁹

In the first category, CDSs can be used to hedge the credit risk of on-balance sheet assets (e.g. corporate bonds or asset-backed securities) by acquiring CDS protection on them. Such protection provides capital relief and insures the acquirer of protection against credit losses (assuming the terms of the CDS contract provide for perfect hedging). Commercial banks and other lenders are natural buyers of CDS protection for such purposes, while highly rated dealers, insurance companies, financial guarantors and credit derivative product companies were the typical protection sellers prior to the financial crisis.

⁹ A. Yavorsky, “Credit Default Swaps: Market, Systemic and Individual Firm Risks in Practice”, Moody’s, October 2008.

They can also be used to hedge counterparty exposure. As part of their daily trading activities, dealers take on unsecured exposures to other financial institutions. Credit default swaps provide a mechanism for the hedging of such counterparty exposures and are highly sought after by market participants during periods of considerable market distress. They provide protection by producing a gain if credit spreads on their counterparties widen.

Derivatives can also be used as trading tools, for speculating or arbitrage purposes. Speculators and arbitragists add liquidity to the market by “connecting” markets and eliminating pricing inefficiencies between them.

First, they allow a counterparty to acquire long exposure to credit assets in an unfunded (synthetic) form when selling CDS protection. The leverage embedded in credit default swaps (like that in other derivative instruments) offers a higher return on equity than acquiring the credit assets outright. In the presence of widening credit spreads, CDSs can offer equity-like returns and are therefore attractive to hedge funds, or even the more traditional bond funds. In addition, credit default swaps, by their very nature as OTC products, can be used to create bespoke exposures by enabling counterparties to choose either single-name or multi-name reference entities and by customising their pay-off triggers and amounts. These highly customised products are usually illiquid and consequently require a substantial amount of sophisticated modelling to estimate potential pay-off scenarios.

Second, CDSs also allow the acquisition of uncovered short exposure to credit assets when buying CDS protection. The acquirer of CDS protection effectively shorts the underlying reference asset(s). Shorting cash bonds is considerably more difficult because it requires the short-seller to borrow the assets, which is usually difficult to accomplish with fixed income securities, particularly if the short-seller seeks to go short on a portfolio of assets. Hedge funds, or dealers with long CDS exposures,

which need to be hedged, are active acquirers of CDS protection.

To conclude, CDSs are not only risk management tools for banks but also contribute to the completeness of the market, by providing market participants with a possibility to take a view on the default risk of a reference entity, on a company or a sovereign borrower. Thereby and as shown during the crisis, derivatives allow for pricing of risk that might otherwise be difficult due to lack of liquidity in the underlying assets.

3.2 DATA SOURCES

Table 3.3 presents an overview of the public data sources currently available for CDS volumes. The most recent of these datasets is the DTCC’s statistics on CDS volumes. The DTCC estimates that it covers 90% of the credit derivative contracts worldwide, including over 95% of all inter-dealer CDS contracts measured in terms of the number of contracts (rather than notional amounts). The data are based on the DTCC’s TIW database. As the data are based on actual settlement instructions, this may currently be the most accurate data source available.¹⁰

DTCC data on net notional amounts (e.g. net notional outstanding amounts) also reflect the effect of netting activities and are the most accurate source of reference for CDS-related credit risk posed by reference entities – as well as for traded amounts, which constitute a welcome improvement.

However, at this stage there are several ways in which DTCC data can be improved further in the interests of macro-prudential assessment.

First, the DTCC does not provide retroactive information on trades, as its published CDS statistics only begin at the end of October 2008. One consequence of this is that the data do not cover the credit market developments during the

¹⁰ The availability of security-by-security data allows customised data queries, which enabled the DTCC to respond to a range of special queries in support of this report.

Table 3.3 Data source overview

Dataset	Description	Frequency	Starts	Last available
DTCC	The Depository Trust and Clearing Corporation (DTCC) started to release weekly statistics regarding the gross, net and bought or sold notional amounts in CDS market in November 2008 (referencing end-October 2008). The data was augmented with weekly transaction volume data in January 2009.	Weekly	October 08	2009
ISDA Market Survey	The ISDA publishes a semi-annual market survey which in addition to other OTC derivatives since December 1995 includes the notional amounts bought and sold of credit default swaps based on voluntary responses from approximately 60 institutions.	Semi-annual	1995	2008
Semi-annual OTC derivatives statistics	The Bank of International Settlements (BIS) undertakes a semi-annual voluntary CDS survey covering approximately 80 institutions within the G10 countries and Switzerland on credit default swaps (CDS). The survey results including notional amounts outstanding and gross market values for single- and multi-name instruments bought and sold by survey respondents. Additionally information on CDS by counterparty, sector and rating has been made available as of December 2005.	Semi-annual	End-2004	End-2008
Fitch Ratings Credit Derivatives Survey	Fitch Ratings has conducted an annual credit derivatives survey for the reference years of 2003 to 2009 encompassing the amount bought and sold by industry sectors, broken down by main instrument types and the reference credit ratings. This survey was not conducted for 2007. Compared to other data sources, the Fitch survey highlighted the net selling positions of hedge funds and insurance companies, notably AIG, including as well named rankings of the largest players and the sector net positions in 2006. The survey was based on 26 institutions in 2009 (86 institutions in 2006).	Annual	1996	2006
British Bankers Association Credit Derivatives Survey	The British Bankers Association (BBA) undertakes a bi-annual survey regarding credit derivatives since 1996, covering significant players in the international credit derivatives market. The survey participants provide estimates for the growth of the CDs market broken down by type of institution, geographical area and instrument types including the ratings of the reference asset. This survey was not undertaken for the reference year of 2008.	Bi-annual	1996	2006
BIS Tri-annual OTC derivatives statistics	The BIS also collected CDS data within its Tri-annual survey for the first time in December 2007, referencing approximately 1,500 banks from 54 countries as per end-June 2007. Each participating central bank collects data voluntarily reported by banks and dealers in its jurisdiction and calculates aggregate national data. These are provided to the BIS on a anonymous basis, which compiles global aggregates.	Tri-annual	End-2007	End-2007

Source: BSC.

period directly before and after the failure of Lehman Brothers.

Second, the counterparty breakdowns are not very detailed. They are currently limited to “dealers” versus “non-dealers”. In addition, the definitions of these categories are not consistent with those employed for previous market data collected by the BIS. Third, no information is provided on the market values of CDS contracts. Thus, new DTCC data are useful only in order

to assess credit risk, being of limited use for assessing counterparty risk.

Fourth and most importantly, the scope of its data coverage is far smaller than for BIS data (see Box 1 for figures).¹¹ In terms of products, basket CDSs or bespoke CDSs are to a large extent not covered, since bespoke contracts are

¹¹ Initiatives are currently under way within the DTCC to make its coverage more comprehensive.

not yet cleared by the DTCC. Its data coverage relates primarily to single-name, index and index tranche CDSs. A particularly pertinent example concerns American International Group Financial Products, the monolines and the CDPCs. These three types of CDS sellers are not respondents to the BIS survey and so are not captured by traditional reporting methods, which are tailored mainly to banks. However, the DTCC data would not have enabled this gap to be bridged, as those entities typically sold protection via bespoke contracts.

In addition, the coverage of medium-sized and smaller banks is better in the BIS data, whereas the DTCC data are based solely on the trades included in the TIW, which is primarily a service for inter-dealer and dealer-to-client trades. This may cause the DTCC statistics to be biased towards representing large banks' transactions.

Most European banks now disclose basic information about their CDS exposures to investors, although details of credit reference assets' credit ratings, counterparty concentration in terms of gross notional amounts as well as market values of CDS bought and sold, and collateralisation levels are not typically disclosed. Some European banks only disclose the aggregate notional amount of CDSs bought and sold. Overall, the information provided in public accounting statements varies across institutions, given that disclosure requirements are not harmonised across the EU. The ultimate level of disclosure does not, therefore, enable investors to evaluate different institutions' level of involvement in the credit market on a harmonised basis as net sellers or buyers, or their actual exposures to risk, although the overall size of their notional or gross market value exposures is indicative of their relative activity within the CDS market.

The most recent version of the Guidelines on Financial Reporting (FINREP) developed by the Committee of European Banking Supervisors (CEBS) includes as part of its core template a requirement for banks to report notional outstanding amounts for credit derivatives

bought and sold. The CEBS has recast this template, which now includes the fair value of such derivatives, and the recast version is currently undergoing a general consultation with market participants. This is expected to conclude in 2009. However, the concentration level for major counterparties, levels of collateralisation and credit ratings of underlying assets are not currently addressed in this version. In some countries, however, regulators have collected considerable amounts of data. For instance, the US Office of the Comptroller of the Currency (OCC) collects a markedly wider range of data in its quarterly report on banks' derivative activities – including notional and gross market values for CDS reference entities broken down by credit derivative instrument type, by maturity, and into investment-grade and non-investment-grade derivatives. In addition, the level of collateralisation for net OTC derivative exposures will be published as of the second quarter of 2009, with that first data release envisaged in September 2009.¹² These data should, in principle, also be available for affiliates of European banks regulated by the Federal Deposit and Insurance Corporation, which collects the call reports used to produce the OCC derivative report.

The various data sources now provide a good overview of the aggregate market size, although there is currently a high degree of opacity both at the aggregate level and at the firm level as regards banks' exposures to bespoke CDSs and some other market segments. The differences in terms of data coverage emphasise the need to bridge the various data sources. Although aggregate data on market volumes have improved, regular firm-level data disclosed to regulators with regard to their OTC derivative exposures and counterparty concentration still need to be enhanced.

¹² <http://www.occ.treas.gov/deriv/deriv.htm>

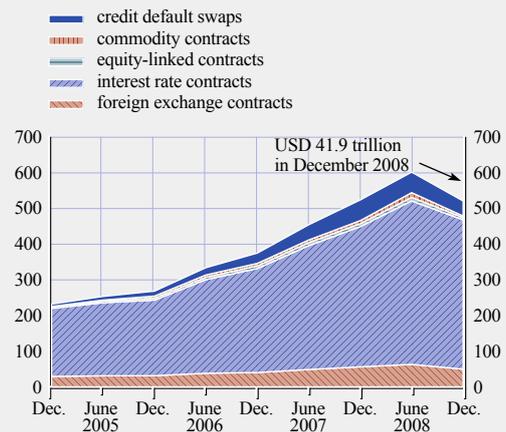
3.3 MARKET SIZE AND STRUCTURE

According to the half-yearly BIS OTC derivative statistics, credit derivatives accounted for 7% of total outstanding OTC derivatives at the end of December 2008 in terms of nominal amounts (the equivalent of USD 42 trillion; see Chart 3.2). The gross notional value of contracts bought and sold is currently the preferred indicator when assessing the size of the CDS market. However, this is only very loosely related to risk, and even with these basic data, different sources give very different estimates of the size of the CDS market, although trends regarding market volumes are similar across data sources (see Chart 3.3).

In terms of gross market value, which is a more closely correlated measure of the magnitude of risks embedded in the OTC market, the CDS market increased from USD 133 billion in December 2004 to USD 5.7 trillion in December 2008 and constitutes the second largest market in terms of gross market value after interest rate contracts (see Chart 3.4). The increase in gross market values in 2007 and 2008 mainly reflected increased volatility and the repricing of credit risk in the market during this period.

Chart 3.2 Notional amounts outstanding for OTC derivatives

(USD trillions; December 2004 – December 2008)



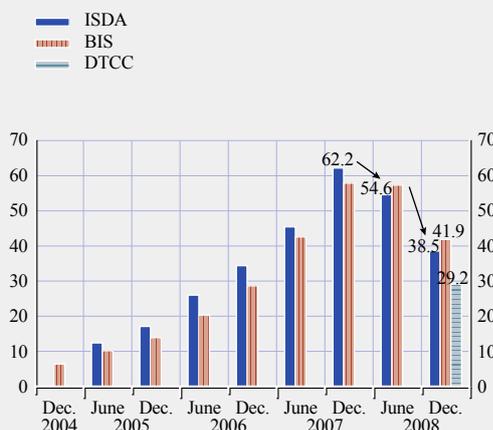
Source: BIS.

The credit derivative market has grown much faster than other derivative markets, and the gross notional amount of outstanding CDS protection bought and sold at the end of 2008 was seven times that of end-2004.

One factor contributing to this growth is the OTC nature of CDS contracts, as offsetting trades are often used instead of the termination

Chart 3.3 Notional amounts outstanding for credit derivatives

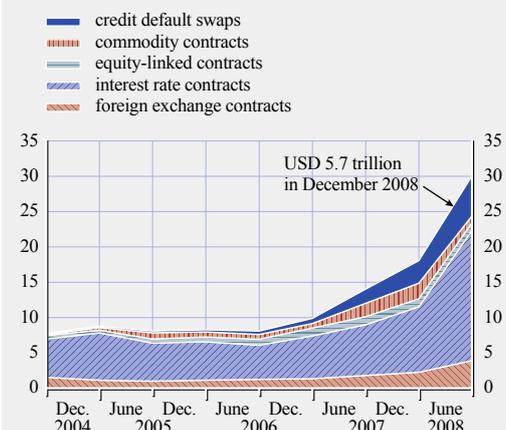
(USD trillions; December 2004 – December 2008)



Sources: BIS, DTCC and ISDA.

Chart 3.4 Gross market values for OTC derivatives

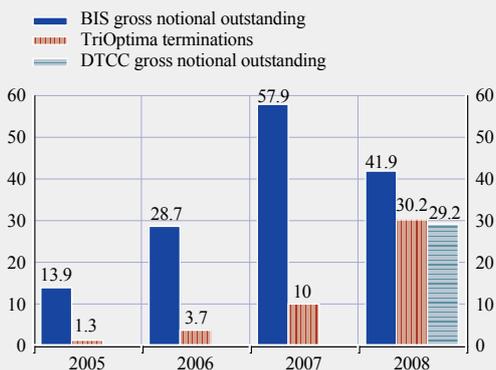
(USD trillions; December 2004 – June 2008)



Source: BIS.

Chart 3.5 Outstanding credit derivatives and multilateral terminations

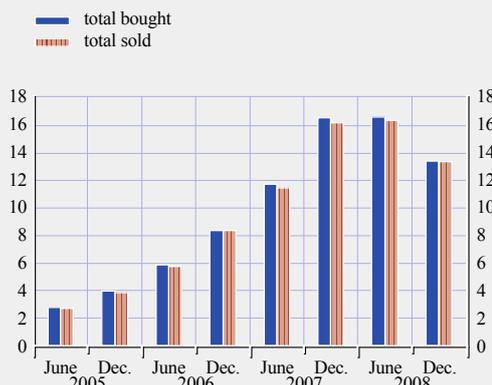
(December 2004 – December 2008)



Sources: TriOptima and ECB calculations.

Chart 3.6 Notional amounts of CDS contracts bought and sold

(December 2004 – December 2008)



Source: BIS.

or replacement of former contracts. Instead, a chain of linked exposures arises, in which market participants know their direct counterparties but not the parties further down the chain.

By contrast, in the second half of 2008 the size of the CDS market shrank significantly. In addition to decreasing volumes of new trades as a result of the declining number of participants following the failure of Lehman Brothers, a significant factor contributing to this reduction was banks' active participation in "termination cycles" (see Chart 3.5), leading to the compression of redundant positions, mainly in CDS indices, through multilateral terminations.

Following these multilateral termination efforts, notional amounts of outstanding CDS contracts declined by 25% between June and December 2008 in the EU5. This reduction is similar to the overall decline in notional amounts of outstanding CDSs (see Chart 3.6).

Exchange rate movements may also have played a part in this decline. EU banks report their notional positions to the BIS in US dollar equivalents, and the euro and the pound sterling depreciated by 30% and 12% respectively against the US dollar during that period. The exposures of European banks should decline by

between 4% and 25% if notional outstanding amounts are adjusted for currency movements, although more precise estimates cannot be made, as currency breakdowns for the underlying notional amounts are not available.

At the end of December 2008 the EU5 accounted for 40% of total outstanding CDSs in terms of notional amounts (in US dollar-equivalent terms). Interestingly, the EU5 banks' holdings of multi-name products are substantial, accounting for 45% of the total market for CDS indices, compared with 37% for single-name CDS contracts.¹³

3.4 CDS COUNTERPARTY RISK MEASURES

This section will review various measures of counterparty risk (see Chart 3.7) and specific attributes of each such measure.

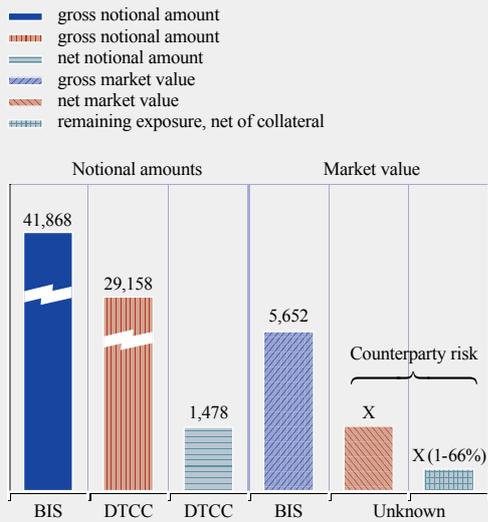
GROSS NOTIONAL AMOUNTS

The notional amount of a credit default swap refers to the nominal amount of protection bought or sold on the underlying bond or loan.

¹³ The gross notional amount of USD 42 trillion reported by the BIS refers to the total amount of protection bought and sold worldwide. EU dealers' share in that global total cannot, however, be calculated accurately, since CDSs sold by one EU dealer and bought by another would be counted twice: once as a sold CDS and once as a bought CDS.

Chart 3.7 Counterparty risk measures

(USD billions; 31 December 2008)



Sources: BIS, DTCC and ECB calculations.

Notional amounts are the basis on which cash flow payments are calculated.

The gross notional amount reported by the BIS is the total of the notional amounts of all transactions that have not yet matured, prior to taking into account all offsetting transactions between pairs of counterparties. As outlined above, gross notional amounts thus represent a cumulative total of past transactions. Using gross notional amounts as an indicator of counterparty risk may be misleading, as many trades are concluded with a single counterparty.

Once negotiated, CDSs bind both counterparties until the agreed maturity. Market participants basically have three choices when increasing or reducing their CDS exposures.

First, they can terminate the contract, provided the counterparty agrees to the early termination. Second, they can find a third party to replace them in the contract, provided the counterparty consents to the transfer of obligations (“novation”). As a third option, dealers that want to unwind or hedge their positions

can also enter into offsetting transactions, sometimes (though not necessarily) negotiated with the same counterparty as the hedged deal. The third solution is used extensively, and so the number of trades has surged, resulting in an increase in total gross notional amounts. Indeed, this technique, by contrast with the other two, does not eliminate previous deals and instead adds them together. The end result is that external market commentators tend to pay too much attention to the gross market values in relation to other measures of the real economy such as GDP, whereas net notional amounts, where accounted for, may be downplayed or perceived as being very low or moderate in relative terms given the huge gross notional amounts outstanding.

NET NOTIONAL AMOUNTS

Having taken into account all offsetting transactions between pairs of counterparties (i.e. outstanding transactions relating to exactly the same reference entity – whether a specific borrower, a CDS index or a tranche of a CDS index), the net notional amount is the basis for calculating the net payment obligation in a credit event. In the event of a default, the payment made (under cash settlement) by the protection seller is equal to:

Net notional value × (1-recovery rate (%) of a reference obligation).

The net notional value is thus a proxy for the contribution made by CDSs to an institution’s risk exposure, as it represents the maximum amount of funds that could theoretically be transferred from the seller of protection to the buyer, assuming a zero recovery rate following a default by the reference entity.

In the case of CDSs which reference an index tranche, the net notional value represents the maximum amount of money that the seller of protection could be asked to transfer, assuming losses exceed the tranche’s attachment point.

The DTCC provides aggregate net notional data for single reference entities. These comprise the

Table 3.4 Actual risk exposure (net notional amounts before collateralisation)

(USD billions; December 2008)

	Gross notional amounts	Net notional amounts	Ratio (net/gross)
Single-name CDS contracts	14,830	1,477	10%
CDS indices/CDS index tranches	14,328	1,276	9%

Source: DTCC.

sum of net protection bought (or sold) across all counterparties (see Table 3.4).

MARKET VALUES

The mark-to-market value of a CDS on a given reporting date is the cost of replacing the transaction on that date. The market value of a CDS is equal to the discounted value of all cash flows expected in the default leg (i.e. the payment to be made by the protection seller in the event that the reference entity defaults) and the fee leg (i.e. the agreed spread that the protection buyer has to pay every quarter), taking into account the probability of the reference entity defaulting. If that entity does indeed default, the market value should be equal to the notional value of the CDS, less the expected recovery value.

The BIS, in its derivative statistics, defines “gross market value” as the value of all open contracts before counterparty or other netting. Thus, the gross positive market value of a firm’s outstanding contracts is the sum of all the positive replacement values of a firm’s contracts. Similarly, the gross negative market value is the sum of all the negative values of a firm’s contracts.

Gross market value is not an accurate measure of counterparty risk, as it does not take into account the effect of netting for each pair of counterparties. However, this measure reflects the changes that take place in trades’ market values between the inception date and the reporting date.

NET MARKET VALUE/GROSS COUNTERPARTY EXPOSURE

The net market value is not calculated solely for dealers’ CDS positions, but across all of their OTC derivative positions. Thus, this measure of gross counterparty risk is not available for CDSs alone, as dealers do not manage their counterparty risk exposure by asset class.

The net market value across counterparties is also referred to as “gross credit exposure”. Counterparty risk reflects the risk of being forced to replace positions in the market were a counterparty to default, and net market values would therefore be a measure of counterparty risk, assuming there was no collateralisation.

Unfortunately, however, neither gross nor net market values for CDS contracts are currently available from the DTCC.

NET COUNTERPARTY EXPOSURE

The counterparty exposure that remains after collateralisation represents genuine counterparty risk. However, it remains very difficult to quantify this counterparty risk given the nature of the data available.

3.5 CONCLUSIONS

The most common concern reported by EU banks in response to the survey was counterparty risk.

Three conclusions can be drawn. First, large concentrated pockets of counterparty risk within the financial system cannot be assessed using aggregate data, since the data available are not broken down to the level of specific counterparties. Additional disclosures by individual institutions on their largest exposures – in terms of counterparties and instruments, and for amounts both bought and sold – would be necessary in order to carry out such analysis.

Second, the data published by the BIS and the DTCC are not in line, which could impair their use as an effective regulatory tool. Indeed,

more work could be carried out with regard to methodology and metadata to allow the linking of the reporting frameworks. This would make it easier to cross-check statistical aggregates for the entire CDS market, as well as improving the quality and scope of the data.

Third, another area for possible improvement is enhanced public disclosure. The most active

institutions could regularly disclose their total gross notional amounts and gross market values for bought and sold CDSs, as well as net market values for uncollateralised derivative transactions. This information could also be provided for those institutions' largest counterparty positions and could be disclosed to regulators or included in the institutions' public financial statements.

Box 1

DTCC VS BIS OTC DERIVATIVE SURVEY DATA – A COMPARISON OF COVERAGE

The sources of the data provided by the BIS and the DTCC are quite distinct. The BIS data are taken from a voluntary survey, whereas the DTCC's data are derived from the repository system where its information on deals between counterparties are reconciled and subsequently stored. This determines to some extent the frequency of the data. While the DTCC publishes its statistics once a week, the BIS conducts its survey biannually. In May 2009, when the BIS published its end-2008 figures, the data from the two sources could be compared for the first time. The BIS survey participation is voluntary, whereas DTCC data is based on actual CDS settlement instructions, which in theory would imply that the latter data source should have a higher coverage and demonstrate higher CDS contract volumes.

According to the BIS, the value of outstanding credit default swaps was USD 41.9 trillion, whereas the DTCC reported USD 29.2 trillion. This difference was mostly due to the more limited coverage of CDS contracts entered into by non-dealers within DTCC data. The DTCC repository contained details of 98% of the CDS contract volumes between dealers reported in the BIS survey.¹ However, in volume terms, only 29% of the CDS contract volumes between non-dealers covered by the BIS survey were reported to the DTCC trade information warehouse. The lower coverage in DTCC data seems to mainly be due to a lower coverage of single name CDS contracts in DTCC data entered into by non-dealers, constituting 27% of the volumes within BIS statistics.

The BIS survey seemed to cover more single-name CDS contracts and fewer multi-name contracts than the DTCC. The BIS has investigated this issue and found that one potential reason for this discrepancy is the fact that some of the dealers reporting information in the OTC derivative survey may have reported credit default tranches as single-name instruments.

All in all, the two sources of data tend to be complementary rather than substitutes, given the differences between them in terms of their coverage, the scope of the breakdowns reported, the frequency of publication and the delays in the publication of the data. In principle, the main gap appears to be the limited coverage of single-name CDS contracts entered into by non-dealers within the DTCC statistics. The current lack of coverage of bespoke CDS contracts is another

¹ According to the BIS, this Chart falls to 94% for both dealers and non-dealers when the same reporting sample is used.

area where the DTCC data are lacking. However, the DTCC is currently working on broadening its coverage of non-dealer activity in the CDS market. Once these data have been made public, they could be used for an up-to-date in-depth analysis of the entire CDS market, since an in-depth analysis is currently possible only for CDS dealers.

The BIS may for the time being remain the benchmark when it comes to assessing the size of the CDS market and its ranking as regards the other OTC derivative markets. However to portray an area which could be improved, it can be noted that the BIS and the DTCC define “dealers” in different ways. Traditionally, a dealer is a commercial bank that underwrites and trades in bonds and other debt securities. The BIS classifies all survey respondents as dealers in its OTC derivative statistics, whereas the DTCC classifies all banks and non-banks (as well as their affiliates) that are in the business of making markets or dealing in credit derivative products as dealers. Non-dealers comprise smaller banks, hedge funds, fund managers and insurance firms. There are no retail participants in the CDS market. BIS and DTCC would thus have to be bridged in order to give regulators and market participants a comprehensive overview of developments in the market.

Outstanding amounts of credit default swaps

(USD trillions; as at end-2008)

	Dealers			Non-dealers		
	DTCC (A)	BIS (B)	Ratio (A/B) ¹⁾	DTCC (A)	BIS (B)	Ratio (A/B) ¹⁾
Single-name instruments	12.2	15.8	77	2.6	9.9	27
Multi-name instruments ²⁾	12.2	9.2	133	2.2	6.9	33
Total contracts	24.4	25.0	98	4.9	16.8	29

Sources: BIS and DTCC.

1) In percent.

2) DTCC data include credit default tranches and credit default indexes.

4 COUNTERPARTY RISK AND ISSUES FOR FINANCIAL STABILITY

This section will review the transmission channels through which CDSs may have contributed to increases in systemic risk.

CDS contracts are commonly regarded as a zero-sum game within the financial system, as there is always a buyer for each seller of CDS contracts, as with all other OTC derivative contracts. The financial turmoil has shown, however, that both buyers and sellers of CDSs may suffer losses if counterparty risks materialise.

Indeed, with CDSs, both parties are exposed to credit risk derived from the counterparty (or “counterparty risk”), which reflects the potential for the counterparty to fail to meet its payment obligations. In other words, counterparty risk reflects the risk of being forced to replace positions in the market, were a counterparty to default.

The replacement cost is of the same magnitude for the two counterparties concerned, but with a different sign. For instance, if there is a deterioration in the creditworthiness of the underlying reference entity (i.e. spreads widen), a trade will have a positive value for the protection buyer (i.e. that buyer is “in the money”), as the protection it already has is now worth more.

This positive value is the additional cost of conducting exactly the same trade with the original spread. Thus, a value of USD 10 billion would mean that it was necessary for a buyer to pay an additional USD 10 million to persuade a seller to take on the trade at the lower spread. Equally, a seller of CDS protection is “out of the money” by USD 10 million, as that party would now require USD 10 million to take on the original trade at the lower spread. If the seller were to then default, the buyer would be entitled to claim from the seller the cost of replacing the trade: USD 10 million. Equally, if the buyer were to default, the seller would

still be required to pay USD 10 million to the buyer.

This requirement to pay even if the money is owed to the defaulting party is a legally binding obligation under the ISDA Master Agreement.

Dealers hedge market risk exposures resulting from a CDS by means of offsetting transactions with another party. If the second party is also a dealer undertaking additional hedging transactions, a chain of linked exposures will arise in which the market participants know their direct counterparties, but not the parties further along the chain.

A number of structural features in the CDS market have helped to transform counterparty risk into systemic risk.

First, the majority of the CDS market remains concentrated in a small group of dealers. Second, the case of Lehman Brothers has shown that the interconnected nature of this dealer-based market can result in large trade replacement costs for market participants in the event of dealer failures. Third, as regards the euro area banking sector, euro area banks appear to have become net sellers of standard single-name and index CDS contracts (although for limited amounts), which would imply exposure to market risk if there is a general increase in CDS spreads – for instance in the event of a dealer failing within the CDS market. Given the limited net values, this could change in the coming months, although the net position of euro area banks remained negative at the end of June 2009. In addition to the shift from those institutions’ historically net positive positions (i.e. as net purchasers), it should also be noted that banks seem to have been net sellers of protection for sovereign CDSs, which may in some cases constitute wrong-way risk. Finally, the low levels of liquidity resulting from the crisis and the current high levels of concentration in the market have both increased trade replacement costs and resulted in significant bid-ask spreads for market participants, particularly for non-dealers.

4.1 CONCENTRATION

The results of interviews and the survey responses of market participants indicate possible over-concentration in the sense of a scarcity of sellers. This, together with liquidity risk, is the main concern of European banks as regards CDS-related counterparty risk (see Table 4.1). A reduced number of counterparties results in increased concentration risk and, consequently, greater systemic risk.

In the CDS market, as in other OTC markets, the major banks (i.e. dealers) trade actively among themselves and account for a large share of the daily turnover in these markets.

Indeed, the CDS market is concentrated around a few large players. In 2008 the five largest CDS dealers were JPMorgan, the Goldman Sachs Group, Morgan Stanley, Deutsche Bank and the Barclays Group (see Table 4.2). This ranking has been calculated on the basis of public filings and seems to be comparable to that listed in Fitch's 2009 derivative survey.¹⁴

A recent survey of U.S. firms by Fitch also indicate that 96% of credit derivatives exposures at the end of Q1 2009 of one hundred surveyed firms was concentrated to JP Morgan, Goldman Sachs, Citigroup, and Morgan Stanley and Bank of America.¹⁵

According to DTCC data, the five largest CDS dealers were counterparties to almost half of the total outstanding notional amounts as at

Table 4.1 Top risks or vulnerabilities related to the CDS market

Large banks ¹⁾	Medium sized banks ²⁾	Small banks
Counterparty risk	Reduction of liquidity	Counterparty risk
		High correlation between underlying and counterparty
		Oddities in the auction process (recovery rates...)

Source: BSC survey.
1) Notional amounts of CDSs bought and sold exceeding €500 billion.
2) Notional amounts of CDSs bought and sold exceeding €200 billion.

17 April 2009 and the ten largest CDS dealers were counterparties to 72% of the trades (see Chart 4.1).¹⁶

As regards BIS data, the market share of major players seems to be larger in Europe than it is for the total global market. This, however, is explained by the difference between the BIS and DTCC data in terms of scope (see Chart 4.2).

The quantitative survey included details of the percentage of trades that the largest dealers conducted with their ten largest clients. The results of that survey, which are similar to the DTCC data, showed a high level of concentration in the CDS market when looking at individual

14 See also "Global Credit Derivatives Survey: Surprises, Challenges and the Future", Fitch, 20 August 2009.

15 See also "Derivatives: A Closer Look at What New Disclosures in the U.S. Reveal", Fitch, July 2009.

16 These proportions are also valid for the gross notional amounts bought and sold.

Table 4.2 Top five CDS dealers

(USD billions; 31 March 2009)

Institution	Bought		Sold	
	Notional	Gross Market value	Notional	Gross Market value
JPMorgan	3,834	514	3,668	479
Goldman Sachs Group	3,430	N/A	3,170	392
Morgan Stanley	3,200	432	3,093	399
Deutsche Bank ¹⁾	6,191 ²⁾	411	N/A	363
Barclays Group ¹⁾	6,033 ²⁾	269	N/A	248

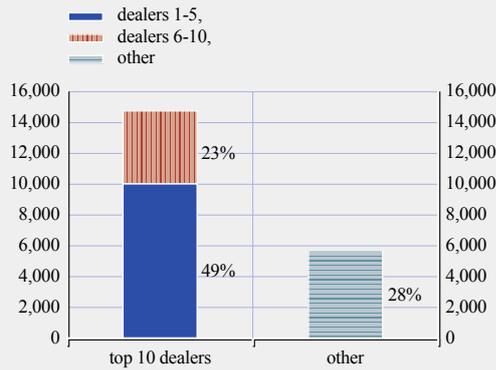
Sources: 10-Q SEC regulatory filings and annual reports.

1) Data as at 31 December 2008.

2) Total notional amounts bought and sold.

Chart 4.1 Total notional amounts of outstanding CDSs sold by dealers worldwide, broken down by ranking

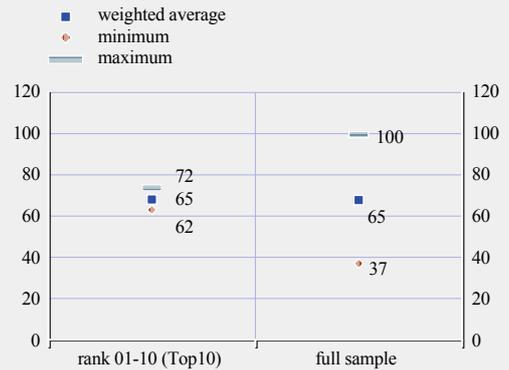
(USD billions; percentages of total; 17 April 2009)



Source: DTCC.

Chart 4.3 Shares of individual banks' ten largest counterparties in gross positive market values

(percentages; December 2008)



Source: BSC survey.

CDS-dealing banks. The survey collected both notional outstanding amounts and positive market value positions. In principle, the latter measure is a better proxy for counterparty risk than notional amounts, as reflects the costs that may arise if trades with counterparties need to be replaced. The survey concluded that 62-72% of the largest EU banks' CDS exposures (measured in terms of

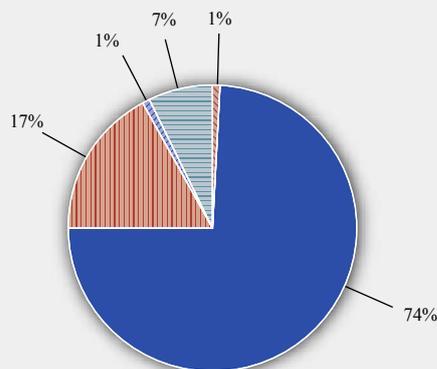
gross market value) were against those banks' ten largest counterparties (see Chart 4.3).

Exposure relative to bank capital is higher for the largest EU banks, for which gross positive market values account for more than 350% of their tier 1 capital, compared with 125% for the average bank in the sample (see Chart 4.4).

Chart 4.2 Total CDS protection bought worldwide

(percentages; December 2008)

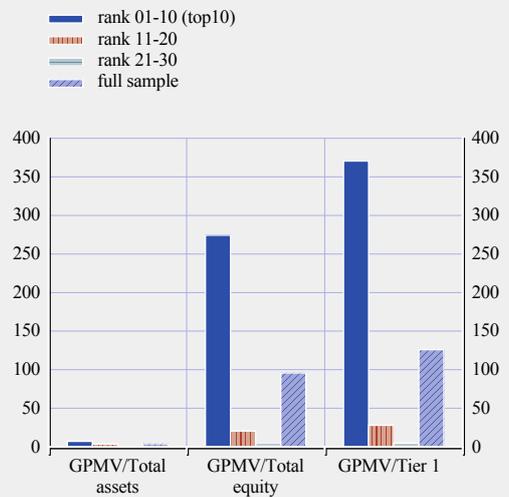
- with reporting dealers
- with banks and securities firms
- with other financial institutions (SPV, SPE, Hedge Funds...)
- with insurance firms
- with non financial customers



Source: BIS.

Chart 4.4 Gross positive market values relative to assets and capital

(percentages; December 2008)



Source: BSC survey.

It should, however, be noted that this indicator does not take into account the collateral underlying these exposures.

The current high levels of concentration in the CDS market probably exceed those observed before the crisis, as the market has seen the exits of the independent CDS dealers Bear Stearns, Lehman Brothers and Merrill Lynch. This has also coincided with the reduction of proprietary trading activities by several European banks and reduced amounts of CDSs sold by hedge funds and exits from the market by large CDS sellers such as AIG, the monolines and the CDPCs.

It is difficult to demonstrate an increase in concentration using the CDS data provided by the DTCC, as these statistics were first published in November 2008, showing the outstanding amounts of CDS at the end of October 2008, after Lehman Brothers' failure. This report has therefore used the only existing historical series available – the BIS data – to demonstrate this reconcentration of the market and to illustrate non-bank players' retreat from the market since the crisis began.

First, BIS data show that non-bank players have retreated from the CDS market since the crisis began.

At the global level, from 2005 to 2007 non-bank financial institutions accounted for 12% of sales of protection to BIS dealers. This share was 10% in June 2008 and only 7% in December 2008 (see Chart 4.5).

One possible explanation is that, post-crisis, significant losses have eroded capital and the institutions' appetite for the selling of protection. In the non-bank sector, there are fewer active pure protection sellers. Hedge funds, financial guarantors, credit derivative product companies, and synthetic CDOs and SIVs are all examples of net sellers of CDSs prior to the onset of the crisis.

In addition, according to some market participants, the market has experienced a

Chart 4.5 Notional outstanding amounts of CDS protection bought by BIS dealers worldwide

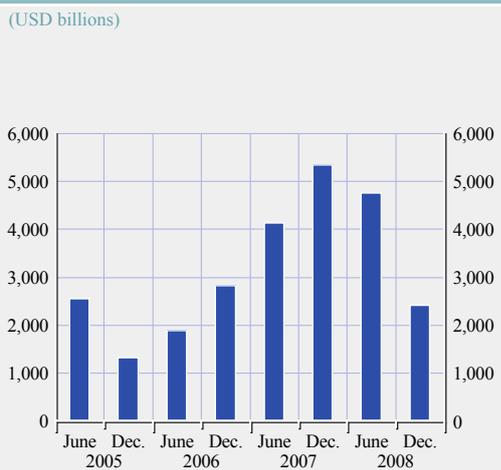


flight-to-quality effect, which has benefited the sounder large institutions and may have been detrimental to the non-bank sector.¹⁷

Market participants have indicated that a number of hedge funds were increasingly pursuing credit-oriented strategies in the run up to the financial crisis, and that these players accounted for significant daily CDS trading volumes. This was also the finding of a Fitch survey in 2006. The level of CDS trading activity has, however, fallen sharply in conjunction with financial deleveraging and fund closures. A record number of hedge funds were levered less than once during the months of September and October 2008 in the face of investor redemption requests, losses, aggressive deleveraging and – potentially – reduced credit lines extended by prime brokers and increased margin calls. This, in combination with bilateral collateral management procedures, may have prevented considerable concentration risk from materialising within the hedge fund community in relation to the CDS market. In the absence of detailed CDS-specific corporate disclosures by institutions, it is not possible to

17 "Institutional Investors See Counterparty Risk As Growing Threat To Global Markets", Greenwich Associates, 12 August 2008.

Chart 4.6 Notional amounts of outstanding CDS protection bought by BIS dealers worldwide from hedge funds



Source: BIS.

identify the losses sustained by non-banks such as hedge funds.

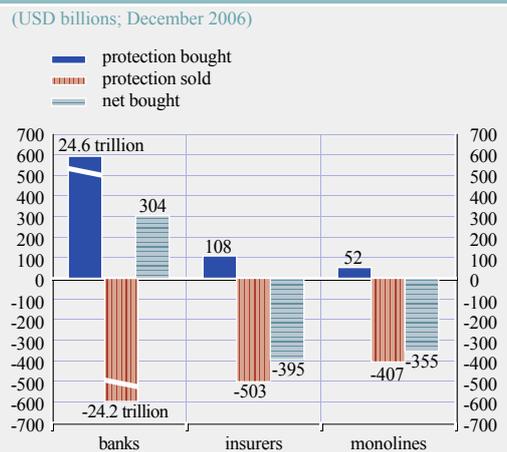
The reduced level of activity by hedge funds is particularly visible within BIS data, which show that the market values of the notional amounts bought and sold by hedge funds increased only modestly during the second half of 2008. Although the overall CDS market decreased owing to compression cycles, it should be noted that gross market values for outstanding CDS contracts increased significantly for all sectors in tandem with rising market volatility. Hedge funds were the exception (see Chart 4.6).

Hedge funds and SPVs' share of total contracts sold to dealers is substantially lower in Europe (at 5%) than it is globally (at 7%). However, a further review of the causes of this difference, including an analysis of the data quality of individual institutions' reports, is warranted. Until 2007, hedge funds sold approximately 8% of the gross notional amount of CDSs bought by dealers. Their share then declined to stand at 5% in December 2008.

WHO ARE THE NET SELLERS OF PROTECTION?

As regards the highly relevant question of who is selling protection today in the CDS market,

Chart 4.7 CDSs bought and sold per sector



Source: Fitch.

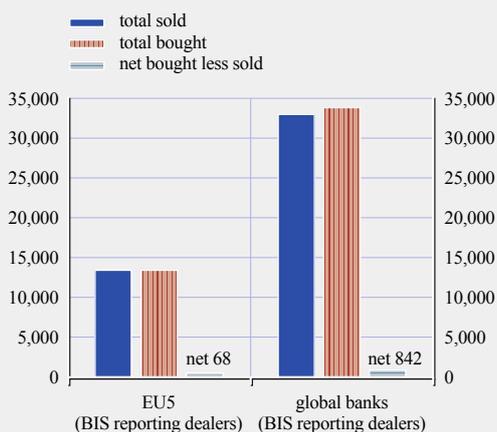
one interesting feature is the fact that euro area banks appear as net sellers in the DTCC statistics. Given that this is only one observation and given the relatively limited amount of net sales, it is too early to say whether these data reflect a structural change.

Before the crisis, global banks used to be net buyers of CDS protection. The Fitch derivative surveys of 2004 to 2006 indicate that the US banks have, on aggregate, run net flat books (i.e. close to equal amounts of long and short positions), in relation to the total amount of CDS bought and sold, as do the OCC's derivative reports. That being said, large negative net exposures have been observed for AIG and the monolines (see Chart 4.7).

When comparing amounts bought and sold in a manner similar to that employed by Fitch but using BIS data, it appears that global banks are net buyers of CDSs, with reporting BIS dealers worldwide having a net position of USD 842 billion (which can be compared to a net bought position of USD 68 billion for reporting BIS dealers from the EU5 countries), although the size of this position does not appear particularly large given the overall size of the market (see Chart 4.8).

Chart 4.8 CDSs bought and sold by EU5 and global banks

(USD trillions; December 2008)

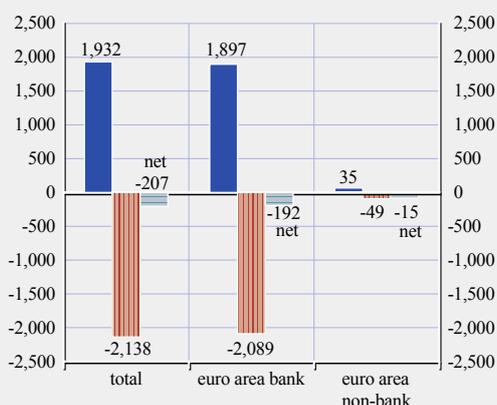


Source: BIS.

However, DTCC data indicate that euro area banks were net sellers in April 2009 (see Chart 4.9), while the majority of the EU banks were found to be net protection buyers in 2003.¹⁸ Those net sales do not appear to be very large and relate to only one point in time. Euro area banks' net sales of CDS protection could also be linked to short equity positions or reflect a relative lack of bought CDSs for protection purposes given the current elevated

Chart 4.9 CDSs bought and sold by euro area banks and non-banks

(EUR billions; as at 17 April 2009)



Source: DTCC.

spread levels. By contrast, the pricing of credit risk may be very high for certain entities, which may encourage banks to sell CDS protection. It should be noted that DTCC data do not encompass bespoke CDS protection that may have been bought by euro area banks from monolines and most CDPCs. However, even though this information would be readily available, the quality of these outstanding bespoke CDSs bought would be difficult to evaluate.

4.2 INTERCONNECTEDNESS

There is plenty of support in the literature for the fact that derivatives increase the interconnectedness between banks. However, this crisis has shown at least three new interesting areas for further study in this respect.

First, when the underlying reference entity for a CDS is a financial institution, the counterparty risk effect can be substantial, as the intermediaries in the CDS market are other financial institutions. In particular, the values of large global financial firms fluctuate together, owing to their interconnectedness in the global markets. The fact that such institutions are tied to each other through chains of OTC derivative contracts means that the failure of one institution can substantially raise CDS spreads on other institutions, making it difficult for investors to separate the credit risk of the debtor from CDS counterparty risk.¹⁹ The need to hedge counterparty exposures has therefore increased for risk management purposes.

Second, the increasing correlation between counterparties and reference entities has recently taken on a new dimension in those countries whose banking sector has been supported by public authorities. The sovereign CDS market for developed countries has surged following the launch of national bank rescue packages.

¹⁸ <http://www.ecb.int/pub/pdf/other/creditrisktransfer200405en.pdf>
¹⁹ Acharya, Engle, Figlewski, Lynch and Subrahmanyam (2008), "From over-the-counter to centralized clearing – The case of credit derivatives", NYU Stern white paper.

Third, market participants which were not perceived to be key or major players within the CDS market prior to the outbreak of the crisis in terms of gross notional amounts have been shown to be too large to fail owing to their links with other key market participants. This was the case with AIG, for instance. AIG was ranked as the 20th largest market participant in the Fitch derivative survey in 2006, with its gross notional exposures only a tenth of the size of the gross exposures of the current largest CDS dealer. Given its position as a “one-way” seller, however, AIG proved to be too systemically important for the insurance market and too interconnected to fail, which required the US Treasury to support it in order to prevent knock-on effects for the financial system.

RISK CIRCULARITY

As mentioned, the first noticeable feature is that this market has experienced increasing demand for guarantees against the failure of financial institutions. In terms of net notional amounts (i.e. the maximum amount at risk), six dealers were among the top ten non-sovereign reference entities at the end of July 2009 (see Table 4.3), compared to seven at the end of 2008.

Furthermore, a breakdown of euro area entities’ net positions indicates that euro area banks are net sellers for single-name financial reference entities, as well as single-name sovereign governments (see Chart 4.10).

Although the majority of the protection sold for financial entities relates to non-euro area reference entities, the relationships between financial players mean that these exposures deserve closer attention, as shown by the cases of Lehman Brothers and AIG.

SOVEREIGN REFERENCE ENTITIES AND WRONG-WAY RISK

The increased correlation in the CDS market between reference entities and sellers of CDS protection lessens the effectiveness of the clean transfer of risk and amplifies the effect of this interconnectedness. This risk, called “wrong-way

Table 4.3 Top ten non-sovereign reference entities on the basis of net protection amounts

(USD billions; as at July 2009)

GE Capital	11.23
Bank of America	7.21
Deutsche Bank	7.17
JPMorgan	6.10
Morgan Stanley	5.95
Goldman Sachs	5.22
Merill Lynch	5.21
Berkshire Hathaway	4.95
Wells Fargo	4.87
The Royal Bank of Scotland	4.31

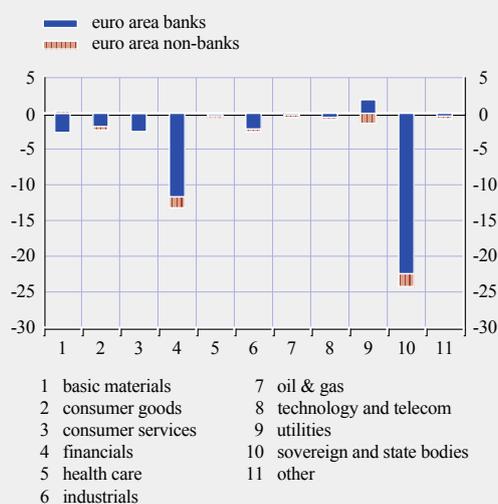
Source: DTCC.

Note: The table excludes AIG.

risk”, occurs when the creditworthiness or credit quality of a CDS reference entity is correlated with the CDS counterpart’s ability or willingness to pay. This wrong-way risk could, for example, apply to affiliates within the same corporate group, but could in principle also apply to wholly separate legal entities which are exposed to similar economic or external risks. Stress testing should be used to identify any wrong-way risk in existing portfolios, with risk mitigants and/or the adjustment of capital employed to reflect any existing wrong-way risk.

Chart 4.10 Euro area residents’ net positions

(EUR billions; April 2009; euro area reference entities)



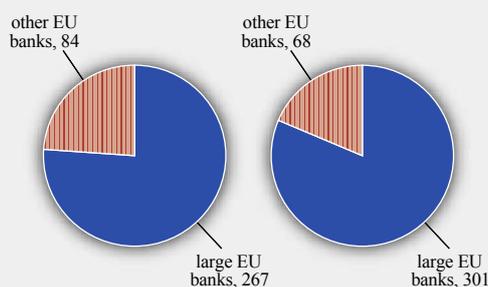
Source: DTCC.

Chart 4.11 Credit market losses, government recapitalisations and other capital raised since the second quarter of 2007

(USD billions)

Writedowns (351 USD bn)
Q2 2007 to 2 June 2009

Capital raised (369 USD bn)
Q2 2007 to 2 June 2009



Source: Bloomberg.

An extreme example of wrong-way risk is CDSs sold by banks on their host sovereign reference countries. A bank benefiting from state rescue packages and then selling protection on the sovereign credit risk of the country in which that bank's parent company is located could be considered a textbook case for wrong-way risks (see Chart 4.11).

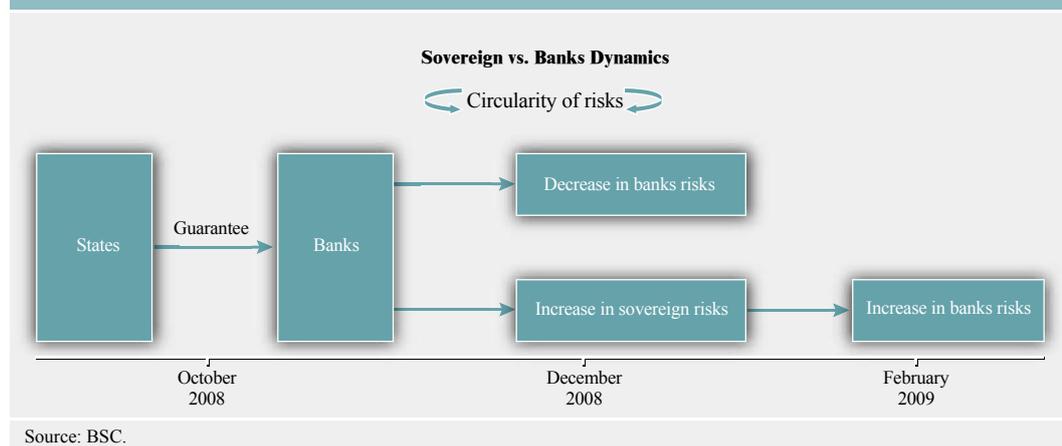
A bank may sell CDS protection against its own sovereign government, although its ability to honour its commitment may be closely linked to the financial health of that sovereign government (see Chart 4.12).

The bank may argue that the market's pricing of its host country's credit risk was excessively high at the time of the sale and that it is unlikely for the economic conditions faced by the host country's central government to deteriorate to such an extent that a sovereign default materialises. It may therefore be economically attractive for the bank to sell CDSs on its host country and accept exposure to this sovereign credit risk. To a certain extent, the bank could also be regarded as acting as a stabilising force in the market, mitigating the effects of speculation regarding widening sovereign CDS spreads.

The actual amount of outstanding wrong-way risk cannot be determined accurately without further details at trade level with regard to CDS protection sellers, CDS reference entities and the amounts bought and sold. The DTCC has conducted a review on the basis of a narrow definition of wrong-way risk for banks which have sold CDS protection on their host governments.²⁰ This review shows a notional amount of €10 billion of CDS contracts being sold by banks against their host sovereign governments as at 17 April 2009, of which €7 billion was sold by European and Swis banks.

²⁰ Branches in foreign countries are not considered to be domiciled in those countries – e.g. London branches of US banks are not included, as these are considered to be US banks.

Chart 4.12 Circularity of bank and sovereign risk



Source: BSC.

Although this amount may be considered relatively small by comparison with the outstanding nominal amounts on the overall market, additional DTCC data relating specifically to euro area banks indicate that euro area banks are currently net sellers of CDSs against euro area governments (see Chart 4.10).

The findings of the DTCC, together with the current net positions of euro area banks, imply that euro area banks have sold CDSs not against their own host governments, but mainly against other euro area countries.

AIG: TOO INTERCONNECTED TO FAIL

Another example of an entity which was too interconnected and too big to fail was AIG. On 30 September 2008 the aggregate gross notional amount of credit derivatives sold by AIG was USD 493 billion – or USD 372 billion on a net basis.²¹ This was an amount which could potentially affect the entire financial network. The net notional amount was almost double the aggregate net notional amount sold by all DTCC dealers combined at the end of October 2008 (see Chart 4.13).

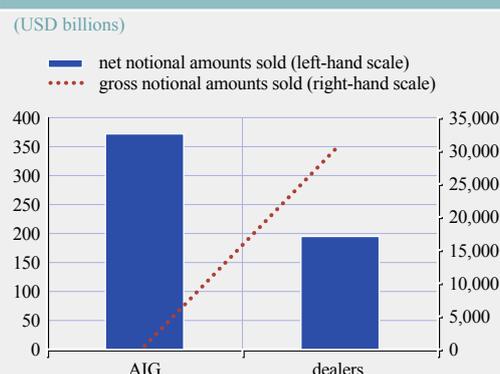
Nevertheless, in 2006 AIG was not ranked among the largest CDS players in Fitch's survey, having just the 20th largest gross notional amount (with net notional amounts not available at that time), showing that aggregate gross notional amounts are not a good measure of risk for financial stability purposes. Furthermore, AIG mainly sold bespoke CDS contracts, which were not covered by the DTCC data, demonstrating a gap in its data coverage which is currently being addressed.

AIG's main counterparties and the mark-to-market losses recognised by AIG for those CDS contracts are listed in Table 4.4.

The public support extended to AIG Financial Products enabled its counterparties to maintain their CDS protection.

Added disclosures would have shed light on the scale of the large and concentrated exposures

Chart 4.13 Dealers and AIG: gross and net sold positions



Sources: AIG and DTCC.

of several systemically important participants towards AIG. However, some banks' responses to the qualitative questionnaire have indicated that they have since implemented industry best practices, applying nominal maximum limits for net counterparty exposures, as well as single-name CDSs. In addition, some banks have begun requiring the use of liquidity inputs such as bid-ask spreads in their daily portfolio reconciliation processes in order to

²¹ AIG credit presentation, "Financial Results for Quarter Ended September 30, 2008", 10 November 2008.

Table 4.4 AIG's main counterparties

(USD billions)		
Institution	Aggregate Notional value	Negative Mark to Market value
Société Générale	16.4	8.4
Goldman Sachs	14.0	8.0
Deutsche Bank	8.5	3.6
Merrill Lynch	6.2	3.4
Calyon	4.3	2.4
UBS	3.8	2.0
Deutsche Zentral-Genossenschaftsbank (Coral Purchasing)	1.8	1.0
Barclays (BGI Cash Equivalent Fund II and Barclays)	1.5	1.0
Bank of Montreal	1.4	0.6
The Royal Bank of Scotland	1.1	0.6

Source: AIG.

enhance collateral management practices, with lists of counterparts that are to be monitored closely. The counterparts on such lists are also monitored via their CDS spreads. However, although an institution's accumulation of concentrated exposure to the market may be mitigated by means of prudent bilateral collateral management, such practices may not prevent the general build-up of systemic risk or a high degree of concentration in such risk. Added disclosures for large counterparties and the the largest derivative exposures – i.e. those that exceed certain thresholds – would therefore be very useful in order to enable market participants to better assess their counterparty risk and the potential for systemic spillover effects. However, there are currently no disclosure requirements within the FASB or IASB accounting standards with regard to the main counterparties for derivative transactions.

Box 2**COUNTERPARTY RISK MANAGEMENT AND AIG**

The primary source of AIG's problems was the subsidiary AIG Financial Products.

It acted as the main net seller of bespoke CDS protection for AAA-rated CDO tranches, mainly during the period 2003-2005. Its actions led to concerns regarding financial stability for two main reasons. First, its exposures were in one direction only and of a significant scale. This banking subsidiary of the insurance conglomerate wrote CDS, derivative and future contracts with a notional value of around USD 2.7 trillion, including around USD 440 billion of credit default swaps. The significant net negative exposure of the position held by AIG within this segment was publicly disclosed by AIG and was highlighted by Fitch in its credit derivative survey for 2006, in which AIG was ranked the 20th largest counterpart.

Second, most of its many exposures to European banks were not initially collateralised. In other words, no initial or variation margins were posted for these bespoke CDSs. AIG Financial Products' commitments were instead backed by AIG's AAA rating as the sole and unconditional guarantor. Credit rating triggers within the bespoke CDS contracts stipulated, however, that added collateral be posted in the event of credit rating downgrades by AIG.

AIG reported large losses totalling USD 13 billion for the fourth quarter of 2007 and the first quarter of 2008 owing to write-downs and losses related to US sub-prime mortgage market exposures during that period.¹ In AIG's 10-Q regulatory filing as of August 6, for the second quarter of 2008, it disclosed that USD 17 billion collateral had been posted for its outstanding CDS contracts, with an unrealised loss of USD 15 billion outstanding for those contracts. On 15 September 2008, S&P downgraded AIG's long-term debt rating by three notches, and both Moody's and Fitch Ratings downgraded AIG's long-term debt rating by two notches. As a result of those rating triggers, AIG estimated that it would require a further USD 20 billion in order to fund additional collateral demands and transaction termination payments, for which it had insufficient liquidity.

¹ See also the ECB's Financial Stability Review of June 2008.

The challenges experienced by AIG Financial Products were accompanied by liquidity stresses within AIG's securities lending operations.² AIG's securities lending was consolidated by the holding company in a special unit that it set up and controlled. This special unit was not a licensed insurance company. As with some other holding company activities, it pursued this strategy aggressively rather than prudently. AIG maintained two securities lending pools, one for US companies and one for non-US companies. At its peak, the US pool had a value of around USD 76 billion. The US securities lending programme consisted of 12 life insurers, three of which were from New York. Those three New York companies contributed around 8% of the total assets in the securities lending pool. The programme was largely invested in highly rated mortgage-backed securities, which accounted for 60% of the collateral pool. The severe difficulties experienced by AIG Financial Products caused the equivalent of a run on AIG's securities lending operations. Borrowers that had reliably rolled over their positions from period to period for months began returning the borrowed securities and demanding their cash collateral. Between 12 and 30 September 2008, borrowers demanded the return of around USD 24 billion in cash. The holding company unit that managed the programme had invested the borrowers' cash collateral in mortgage-backed securities that had become hard to sell.

The credit rating downgrade triggers exacerbated AIG's liquidity position, but also exacerbated AIG's credit problems, given the firm's need to raise capital in a strained liquidity environment. This combination of factors led to a liquidity drain which prompted the US Treasury to intervene. In the 15 days or so that followed the rating downgrades, AIG Financial Products then funded approximately USD 32 billion of collateral calls, reflecting not only the effect of the downgrades, but also changes in market values and other factors. To avoid massive losses from sudden forced sales, the federal government, as part of its rescue package, also provided liquidity to the securities lending programme. In the first few weeks of the rescue, holding company rescue funds were used to meet the collateral needs of the programme. Eventually the Federal Reserve Bank of New York created Maiden Lane II, a fund that purchased the life insurance company's collateral at market value for cash.³

The consolidated supervisor of AIG, the OTS, has indicated that it did not foresee the extent of the concentration of risk within AIG, the sensitivity of the illiquid bespoke CDSs to credit rating downgrades or the amount of funds required to meet collateral calls.⁴

2 "Testimony on the causes and effects of the AIG bailout", Committee on Oversight and Government Reform, Eric Dinallo, Superintendent, New York State Insurance Department, 7 October 2008.

3 "On December 12, 2008, Maiden Lane II LLC purchased RMBS with an estimated fair value of approximately \$20.8 billion, determined as of October 31, 2008, (Asset Portfolio)." Source: <http://www.newyorkfed.org/markets/maidenlane2.html>.

4 Testimony on "American International Group's Impact on the Global Economy: Before, During and After Federal Intervention" before the Subcommittee on Capital Market, Insurance and Government Sponsored Enterprises, Committee on Financial Services, S. Polakoff, Acting Director, Office of Thrift Supervision, 18 March 2009.

Box 3

MARKET NETWORK STRUCTURE

R. Cont (2009)¹ has shown that the magnitude of financial contagion depends more on the market's network structure than the size of its largest participants. The CDS market can be regarded as an informal network of bilateral counterparty relationships and dynamic credit exposures, the size and distribution of which are closely tied to important asset markets. This chain of relationships is inherently complex and difficult to manage. In addition, the high degree of interconnectedness between market participants has also resulted in an increase in the correlation between their spreads following Lehman Brothers' failure.

The diffusion of systemic risk within a network of financial institutions and the impact of single-name CDSs has been modelled, where CDSs introduce contingent links into the network which materialise when a credit event occurs. These new links connect the protection buyer to its counterparty, indicating the claim that would arise were a credit event to affect the reference entity. Where the protection buyer had no initial exposure to the defaulting reference entity, the credit event generates a new link in the network, the value of which could easily reach a considerable amount.

It was found that CDSs increase both the impact of defaults by large institutions and the probability of a default having an impact, as well as systemic risk. Cont's study also underlined the fact that the ratio of speculative CDS contracts to the total amount of CDS contracts outstanding does not affect the impact in terms of systemic risk.

Consideration needs to be given to some specific aspects of the calculation of risk margins for CDSs: the "time-varying volatility" (heteroskedasticity) of spread movements, as well as the high degree of asymmetry and large upward swings in spreads ("heavy right tails"). The potential for default in the underlying asset is a risk specific to single-name CDSs which has to be considered in CCPs' risk management. According to R. Cont, this can be done only by pooling single-name and index CDS positions in a CCP.

¹ See R. Cont, A. Minca and A. Moussa (2009), "Measuring systematic risk in financial networks", Columbia University, Université de Paris.

Box 4

LEHMAN BROTHERS' FAILURE: AN EMPIRICAL TEST OF THE CDS MARKET

Timeline

9 June 2008: Lehman Brothers announces a loss of USD 3 billion for the second quarter of 2008, the first in the company's 14-year history under public ownership, together with a capital increase of USD 6 billion. Lehman Brothers also discloses a significant amount of what have been termed "legacy" assets. These illiquid assets had been accumulated in anticipation of future securitisation and had to remain on Lehman Brothers' balance sheet following the collapse of the securitisation market.

11 September 2008: Lehman Brothers reports its worst loss ever – a loss of USD 4 billion for the third quarter of 2008, driven by USD 7.8 billion of credit asset write-downs. An extensive restructuring plan is announced, including the selling-off of its asset management unit and the spinning-off of USD 30 billion in legacy assets.

13 September 2008: Both Moody's and Standard & Poor's indicate that Lehman Brothers' credit ratings will be cut if the bank fails to find a buyer, further crippling Lehman Brothers' ability to raise funds. Analysts highlight three important differences between Lehman Brothers' case and the government's bailout of Bear Stearns: (i) Lehman Brothers' business mix differs from that of Bear Stearns; (ii) there would be less systemic risk were Lehman Brothers to fail, as financial institutions have had six months to prepare for that failure; and (iii) the Federal Reserve now has in place an emergency liquidity facility allowing Lehman Brothers to wind down its business operations in a way that will not cause shocks on the markets.

14 September 2008: A special trading session is organised to help the main CDS dealers compress counterparty positions involving Lehman Brothers and rebalance their books through the replacement of trades. This proves unsuccessful, given the short notice, the fact that it's a Sunday and, ultimately, the fact that Lehman Brothers' misses a deadline of midnight on 14 September 2008 for filing for bankruptcy. However, according to anecdotal evidence, most dealers honour trades entered into on this day.

15 September 2008: Lehman Brothers Holdings files for bankruptcy. Secured funding broadly remained in place in the days preceding Lehman Brothers' bankruptcy. However, counterparties increasingly ceased to process ordinary day-to-day business with the firm (e.g. failing to make payments to Lehman Brothers). Most critically, a number of banks that had clearing relationships with Lehman Brothers significantly increased their collateral or deposit requirements, particularly as regards products involving non-simultaneous settlement. Given the magnitude of these clearing firm issues and the likelihood that the demands would continue to increase, Lehman Brothers' management believed it would be difficult for the firm to operate normally and meet its obligations, leading it to file for bankruptcy.¹

10 October 2008: Following established ISDA procedures, an auction is conducted among CDS dealers in order to determine the final price to be used in the cash settlement of CDS contracts referencing Lehman Brothers. This yields a final price of 8.625%.

11 October 2008: The DTCC publishes details of USD 72 billion of gross notional outstanding CDS contracts referencing Lehman Brothers and an estimate of USD 6 billion for related net settlement payments. This follows press estimates of post-credit event pay-outs by protection sellers of up to USD 360 billion.

21 October 2008: A total of USD 5.2 billion in net payments is exchanged between dealers on the basis of the final price determined during the auction held on 10 October 2008.

When Lehman Brothers filed for bankruptcy protection on 15 September 2008 the value of its bonds measured in terms of percent of the bonds' face value plummeted from the 80s to the low 30s. That initial and immediate decline reflected the fact that bondholders had

¹ Testimony before the Committee on Oversight and Government Reform, Richard. S. Fuld Jr, 6 October 2008.

been pricing in a significant possibility of either direct government support or an assisted transfer to another bank, as in the case of Bear Stearns. The price of Lehman Brothers' bonds then declined further, up until the day of the ISDA auction, owing to a multitude of factors, such as the fact that the brokerage arm of Lehman Brothers was sold to Barclays for a price lower than that anticipated by Lehman Brothers' bondholders, as well as broadly based technical selling affecting a host of asset classes during that period. The final recovery rate was slightly below the closing price of Lehman Brothers' bonds on the day preceding the ISDA auction.

What losses did counterparties incur on OTC derivatives with Lehman Brothers as a reference entity?

The actual losses on instruments with Lehman Brothers as a reference entity appear to have been distributed among a number of different entities (including hedge funds), as no large banks (with the exception of Merrill Lynch, as indicated below) have announced concentrated losses related to Lehman Brothers' failure.

What losses did counterparties incur on OTC derivatives with Lehman Brothers as a counterparty?

Moody's, while not disclosing any specific estimates of trade replacement costs, has claimed that trade replacements have proven to be a strong indirect contagion channel in the current crisis. Several market participants that had Lehman Brothers as a counterparty incurred significant losses in novating their trades from Lehman Brothers to other market participants in the days preceding and following Lehman Brothers' failure on account of a correlated simultaneous jump in spreads in the CDS market.² As participants sought to replace positions terminated following Lehman Brothers' default, CDS spreads widened by up to 40 basis points for investment-grade CDSs and by around 100 basis points for sub-investment-grade CDSs. The emergency unwinding of Lehman Brothers' CDS book by major dealers, combined with increased concerns regarding counterparty risk, led to a sharp rise in the price of CDS protection across all entities. The trade replacement costs incurred for trades for which Lehman Brothers was a counterparty were more substantial than the aggregated direct credit losses incurred by sellers of CDSs for which Lehman Brothers was a reference entity. A survey conducted by Moody's reported that the loss positions of counterparties which had not closed out their positions were significant, but within credit rating risk limits. Merrill Lynch disclosed a USD 2 billion pre-tax trading loss in its earnings figures for the third quarter of 2008, partly on account of the unwinding of trades for which Lehman Brothers was a counterparty, as the cost of replacing trades with Lehman Brothers were significantly higher than estimated.³ However, Merrill Lynch was the only major large complex banking group to do so, and no EU banks have attributed aggregated loss estimates to direct credit losses relating to Lehman Brothers' default, counterparty losses or costs incurred as a result of the high costs of novation.

² A. Yavorsky, "Credit Default Swaps: Market, Systemic and Individual Firm Risks in Practice", Moody's, October 2008.

³ Merrill Lynch earnings call for the third quarter of 2008.

4.3 LIQUIDITY

Dealers play an important role in OTC derivative markets, acting both as prime brokers, taking on counterparty risk, structuring products and providing liquidity. Market liquidity²² is a general precondition for market efficiency, and a sudden worsening of market liquidity may degenerate into a systemic crisis. One of the most pernicious threats to market participants is thus the illusion or expectation that market liquidity will be maintained. This illusion means that market participants overestimate their ability to unwind transactions or hedge their positions smoothly and rapidly to meet requirements in unforeseen circumstances, which could, *ex ante*, lead them to take excessive risks. For example, in the case of AIG, it is highly unlikely that AIG's counterparties would have been able to undertake novation given the total collapse of the CDO market to which AIG's bespoke CDS contracts were linked.

The IMF (2006) indicates that narrow bid-ask spreads and high volumes may be imperfect yardsticks by which to measure secondary market liquidity. These measures are susceptible to one-way flows (*i.e.* dealers only), particularly if there is a lack of diversity among market participants, if search and other costs are significant, and if the cost of holding inventory becomes an issue with regard to the dealer's own funding position. Tang and Yan (2007) argue that inventory may become restrictive for dealers in the presence of funding constraints, which has a knock-on effect on the supply of contracts in the market.²³ More importantly, if the liquidity characteristics of these contracts vary over time and there are common liquidity shocks across these markets and the underlying markets, investors may systematically price in a liquidity risk component.²⁴

Some researchers and rating agencies have developed liquidity scores, which mainly combine several aspects of liquidity measures.

They usually combine measures of trade inactivity and staleness of quotes, the dispersion

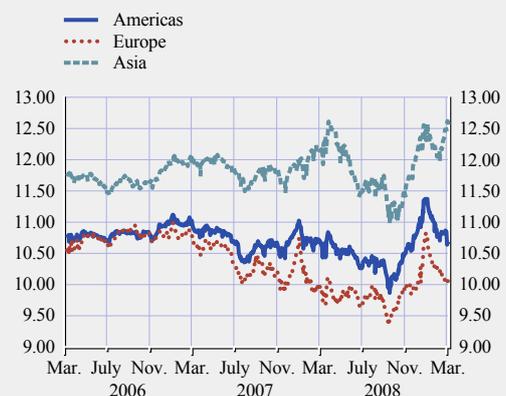
of mid-quotes across contributors and the size of bid-ask spreads, resulting in an illiquidity index (*i.e.* the higher the index, the lower the liquidity).

A deterioration in liquidity could be observed only in the fourth quarter of 2008 following Lehman Brothers' default. During the last quarter of 2008 CDS spreads widened very rapidly, reflecting market participants' view of the increased probability of other entities suddenly defaulting. In this situation, the valuation and quotation of CDS prices became very difficult, having a negative impact on liquidity within the CDS market (see Chart 4.14).

The illiquidity indices show that CDS liquidity is not strictly correlated with credit quality and that some credit risk has to exist in order for CDS contracts to be traded actively (see Chart 4.15). However, CDS liquidity disappears if the probability of default is high, as market participants will be less willing to provide quotes for a CDS reference entity when the probability of a default or a "jump to default" is high for the entity in

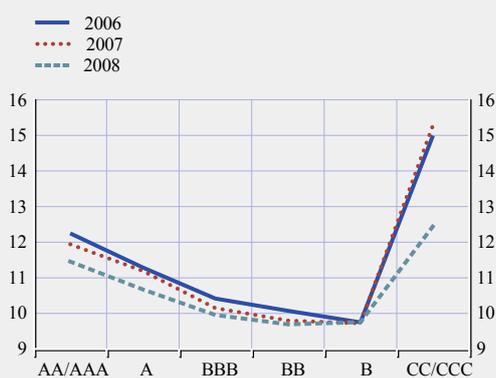
- 22 See Bervas, A. (2006), "Market liquidity and its incorporation into risk management", *Financial Stability Review*, Banque de France.
- 23 See Tang, D. Y. and H. Yan (2007), "Liquidity and Credit Default Swap Spreads".
- 24 See Acharya, V. and L. Pedersen (2005), "Asset pricing with liquidity risk", *Journal of Finance*.

Chart 4.14 CDS illiquidity indices



Source: FitchRatings/FitchSolutions.

Chart 4.15 Global CDS illiquidity indices based on ratings



Source: FitchRatings/FitchSolutions.

question. This is supported by the observations of market participants following the collapse of Lehman Brothers. According to these available liquidity indices, CDS market liquidity seems not to have changed significantly over time.

By contrast, interviews with market participants belie this assessment. While the largest players do not report facing liquidity problems, smaller players do. Survey responses indicate that standard index products such as iTraxx Main and CDX.IG and single-name CDSs with large corporations as reference entities tend to be relatively liquid, with two-way flows. Trade sizes have also generally been reduced, particularly for high-yield names, as some market-makers no longer quote high-yield names.

On one hand, the market currently appears to be better balanced for longer maturities, such as five and ten-year maturities. On the other hand, there has, until recently, been a lack of buyers for single-name CDSs with maturities of less than one year, with the exception of some reference entities with jump-to-default risk. This liquidity shortage for short maturities may reflect liquidity constraints.

The interconnectedness and high levels of concentration among a small group of dealers in the market have helped to increase the liquidity

risk for the market. This has also led to wide bid-ask spreads in the market.

4.4 CONCLUSIONS

While the issues of transparency and the concentration of exposures have always existed, the crisis has demonstrated that greater transparency is required from a systemic risk management perspective. The main conclusions that can be drawn are as follows.

First, extended disclosure to supervisors should be considered for counterparty risk, including indicators of diversification/dispersion both at the market and at the institution level (such as details of the largest exposures to individual protection sellers or industries) to assess the level of concentration in the market. Extended public disclosure could also be considered, although a harmonised approach would be required for such transparency requirements, ensuring a level playing field for market participants.

Second, the sharing and centralisation of appropriate and available CDS information among regulatory authorities should continue to the extent possible under national legal regimes, as this is the only way of obtaining a comprehensive picture of counterparty risk. Data reported voluntarily by individual institutions could also be made available to any regulatory bodies which demonstrate a need for them, thereby also reducing banks' reporting burden.

5 COUNTERPARTY RISK MANAGEMENT

The failure of Lehman Brothers and the near failures of Bear Sterns and AIG have demonstrated the importance of counterparty risk management. This chapter discusses the challenges related to the management of counterparty risk exposures resulting from CDSs and other OTC derivatives. It also looks at state of the art collateralisation practices and provides an overview of European banks' counterparty risk exposures. The techniques currently used to limit, forecast and manage counterparty risk (including netting and the posting of collateral) will also be outlined. The section concludes with an assessment of current collateral management practices and the difficulties encountered by European banks during the recent crisis.

5.1 COUNTERPARTY RISK MANAGEMENT TECHNIQUES

Recent work by the Counterparty Risk Management Policy Group, the Financial Stability Forum²⁵ and the BIS has outlined weaknesses in the OTC derivative markets' ability to handle the default of a major counterparty and indicated a need to enhance the resilience of the market infrastructure.

Parties to OTC transactions are highly dependent on the ongoing creditworthiness, liquidity and operational robustness of their counterparties. This is particularly true for dealers, which act as market-makers by accepting clients' trades and entering into matching contracts with other participants.

The existence of counterparty risk – which reflects the risk embodied in the positions that would have to be replaced were the counterparty to default – adds an additional layer of complexity to the management of financial risks stemming from derivatives, making the design of hedging strategies more complex. These more advanced techniques complement the basic counterparty risk management processes (e.g. sound due diligence and diversification), which remain a fundamental element of risk mitigation.

By way of illustration, consider the very simplest derivative contract: a forward agreement written on underlying asset “S” for delivery time “T”. As the pay-off function of such a contract is linear in relation to the value of S, the hedging strategy is straightforward and identical for the two counterparties, apart from the sign of their hedging positions.

Things change if counterparty risk is introduced into the picture, as in this case when the two counterparties' ex ante contract pay-offs diverge.²⁶

Namely, from the point of view of the party that purchased the asset forward, a counterparty default equates to assuming that the purchasing party sold its counterparty a call-type option on S, the strike price of which is equal to the agreed forward price. Exercising that option would be contingent on the counterparty being unable to delivery the asset at the contract's maturity, which would prevent the forward purchaser from being able to benefit from the potential increase in the price of S.

To offset such a risk, the dealer could implement a more complex hedging strategy, taking into account the probability of the counterparty defaulting over the maturity of the contract. It could also factor in the counterparty's creditworthiness when pricing the forward contract, ending up with a different price for each counterparty.²⁷ A third solution would be to cap the value of the options implicitly sold to its counterparties, requesting that they pay the amount of money owed each time the value of the forward contract exceeds an agreed threshold.

In the real world, banks make use of all three options, with the collateralisation of reciprocal

25 Financial Stability Forum report on enhancing market and institutional resilience, March 2008.

26 U. Cherubini (2005), “Counterparty Risk Derivatives and Collateral Policies: The Replicating Portfolio Approach”, mimeo, University of Bologna.

27 Different prices would stem from the replacement of the risk-neutral measure with a measure mirroring the counterparty's creditworthiness.

credit exposures arising from the evaluation of OTC derivatives being the most frequently adopted means of reducing credit exposures arising from transactions negotiated between dealers.

CDSs play a special role in this situation, as they are simultaneously (i) a driver of counterparty risk similar to other OTC derivatives, and (ii) an instrument used to hedge such a risk, as dealers tend to use CDSs to hedge against the risk of a counterparty defaulting on its derivative exposures.

Counterparty risk for the buyers and sellers of CDSs arises from the mark-to-market changes driven by changes in the CDS spreads of the underlying reference entity between the time of the initial agreement and the valuation time. What distinguishes CDSs from other derivatives is the fact that the skewed distribution of credit risk could suddenly raise the protection buyer's exposure to the protection seller to very high

levels, such that the latter could suddenly be asked to pay the former huge amounts of money, with all the resulting interlinkages between counterparty and liquidity risks. This makes CDS instruments particularly significant in terms of risk.

Dealers can hedge such CDS-related exposures by means of offsetting transactions with another party. If the second party is also a dealer, and that dealer in turn undertakes an additional hedging transaction, a chain of linked exposures will arise in which the market participants know their direct counterparties, but not the parties further along the chain. Recent market events have shown that market participants and regulators have been unable to effectively manage credit exposures, as they have not known the actual location or level of concentration of the credit risk in question. In addition, almost all survey participants and interviewed market participants agree that counterparty risk remains one of the main concerns of European banks.

Box 5

GENERAL CAPITAL REQUIREMENTS TO COVER COUNTERPARTY RISK UNDER BASEL II

The Basel II international capital framework is incorporated in European law through the Capital Requirements Directive, which broadly requires all banks in all major jurisdictions to maintain a consistent minimum level of capital. In practice, however, there are differences in the way this is implemented.

With regard to credit derivative exposures, banks are required to capitalise three major risks, namely:

credit risk – mitigating the risk of a debtor defaulting;

market risk – mitigating losses incurred through fluctuations in market values; and

counterparty credit risk – mitigating the risk of a derivative counterparty failing to fulfil its obligations.

The level of capital required to counter these risks will depend on a number of factors, including whether the instrument is booked in the trading book, the banking book or a legal entity that is not the subject of national prudential regulation. In principle, more capital is required if CDS exposures are booked in the bank's trading book – rather than the bank's banking book – during periods of increased market volatility.

The level of capital required for banks' derivative exposures also depends on whether the bank in question is using standard rules or a recognised advanced model approach, as the former may require a higher level of capital for most institutions.

Furthermore, capital requirements will depend on whether the credit derivative exposure is a "naked" position, taken to gain exposure to the credit risk of the underlying reference asset, or whether the position has been taken for hedging purposes.

Thus, when CDSs are bought as *credit risk* mitigants and booked in the banking book, they are comparable to the unfunded credit protection of guarantees.¹ In such cases, a CDS makes it possible to reduce the capital requirement for an existing exposure in the banking book. The value of the credit protection is calculated in accordance with the credit risk mitigation section of the Capital Requirements Directive. Normally, protection will be limited to the amount that the protection provider has promised to pay in the event of the borrower defaulting or failing to make the necessary payment (or the occurrence of other specific credit events; specific rules apply for certain types of credit derivative). Based on the acknowledged credit protection, capital requirements are determined in accordance with the Standardised Approach or the Internal Ratings-Based Approach within the Basel II framework.

Alternatively, where a bank buys and sells CDSs with trading intent and holds the CDS positions in the trading book, the capital requirement is determined on the basis of the market risk of the position. The capital requirements for *market risks* based on value-at-risk models can be calculated by following a standardised measurement method or using internal models. The capital which has to be held for specific market risks includes: (i) capital to cover the risk of an individual (underlying) debt or equity security moving more than the market as a whole in day-to-day trading; and (ii) capital to cover event and default risk.

To date, the event and default risk element of specific market risk has, in practice, not been adequately modelled by any bank

Finally, the capital requirement calculations for *counterparty credit risk* can be based on one of four different techniques listed in Annex III of the Capital Requirements Directive. The simplest is the original method (whereby the required capital is a percentage of the notional value). The second approach is the mark-to-market method (i.e. current positive replacement costs plus "add on"), and the last two are model-based approaches: the standardised model approach and the internal model approach (whereby the latter includes the calculation of effective expected potential exposure).

¹ Only the following credit derivatives are eligible as credit risk mitigants: credit default swaps, total return swaps and credit link notes (to the extent that they are cash-funded).

5.2 CALCULATING CREDIT EXPOSURE

One of the key elements in the counterparty risk resulting from the negotiation of a derivative contract is the amount potentially at risk if a counterparty defaults: the potential future exposure (PFE). With reference to the earlier example, calculating the PFE means assessing how far "into the money"

the option that each counterparty implicitly sells the other could go. This requires a forecast of the positive mark-to-market value that a derivative transaction could achieve within its contractual maturity. The PFE is thus influenced by the volatility of the underlying risk factors and the design of the derivative pay-off, with the result that highly leveraged transactions have higher

PFEs than standard transactions with the same notional value.

Common approaches for PFE estimation are based on Monte Carlo techniques used to obtain the distribution of PFEs at relevant dates, usually fixed at the transaction's reset dates. As the correct measurement of PFEs requires that the outcome of a very large number of scenarios be examined for each time period, the computational effort is relatively intensive. Consequently, this calculation is usually performed at discretionary intervals.

Banks then grant each counterparty they deal with a credit line compatible with the kind of derivative negotiated and measuring the actual absorption of the credit line over time, with that absorption usually proxied by a chosen value within the PFE distribution. In some cases, the peak PFE value is preferred to the expected value, as it is better at addressing the potential outcome of stressed market conditions. Should the chosen value of the PFE distribution be higher than the credit line, a breach occurs, requiring either an increase in the credit extended to the relevant counterparty or the collateralisation of the excess amount.

Thus, the capital allocated to each transaction is calculated, taking into account the probability of the counterparty defaulting over the transaction's maturity. Institutions that have internal scales for assessing debtors' creditworthiness usually rely on the same estimates when computing the absorption of capital within a trading relationship. Alternatively, the credit assessments of rating agencies are used, where available.

By contrast with other OTC contracts (such as interest rate swaps), CDSs result in credit exposure to both the reference entity and the counterparty in the trade. From the point of view of a purchaser of a CDS, the latter exposure is the more relevant, as its value could easily come close to the transaction's notional value were a credit event to occur with a low recovery rate.

This feature distinguishes CDSs from other mainstream derivatives, where payments are usually fractions of the notional amount underlying the derivative contract. This difference is particularly visible when the credit exposures arising from CDSs and interest rate swaps are compared as percentages of the derivatives' notional value.

Box 6

POTENTIAL FUTURE EXPOSURE: TWO EXAMPLES

Chart A depicts the expected potential exposure of a five-year CDS, where a quarterly spread of 250 basis points is to be paid by the protection buyer in exchange for the transaction's notional value adjusted for the recovery rate (assumed to be fixed at 40%) in the event of the reference entity defaulting.

Potential mark-to-market values have been obtained assuming that the instantaneous intensity of default for the underlying entity will follow a stochastic CIR (Cox Ingersoll Ross) process:

$$d\lambda_t = \kappa_\lambda (\vartheta_\lambda - \lambda_t) dt + \sigma_\lambda \sqrt{\lambda_t} dw_t \quad \text{with}$$

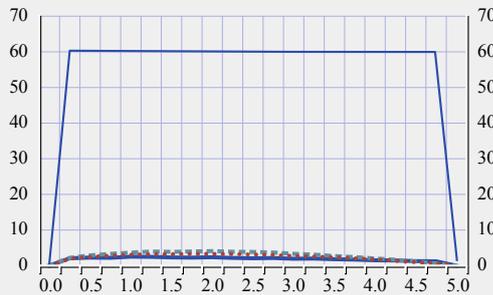
$$\kappa_\lambda = .35 \quad \vartheta_\lambda = .042 \quad \sigma_\lambda = .13$$

Chart A Expected potential exposure: five-year CDS

(percentages of total notional value)

x-axis: maturity (years)
y-axis: percentage of notional value

— CDS mean
- - - CDS 90%
- - - CDS 95%
— CDS 99%



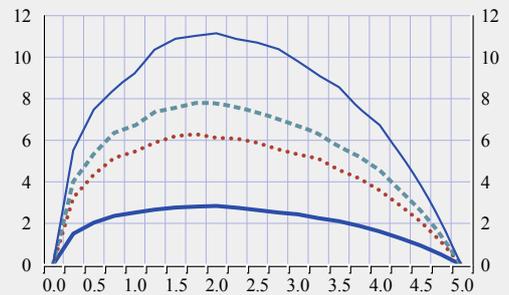
Source: BSC.

Chart B Expected potential exposure: five-year interest rate swap

(percentages of total notional value)

x-axis: maturity (years)
y-axis: percentage of notional value

— swap mean
- - - swap 90%
- - - swap 95%
— swap 99%



Source: BSC.

We run 10,000 simulations and graph, for each reset date identified in the chart below, four elements of the distribution obtained: the mean, and the 90th, 95th and 99th percentiles.

Chart B depicts the expected potential exposure of a five-year interest rate swap, where a quarterly fixed rate of 3.17% is to be exchanged for the three-month Libor.

Potential mark-to-market values have been computed deploying a single-factor model for the interest rate term structure, whereby the instantaneous interest rate follows a stochastic CIR process:

$$dr_t = \kappa_r (\vartheta_r - r_t) dt + \sigma_r \sqrt{r_t} dw_t \quad \text{with}$$

$$\kappa_r = .53 \quad \vartheta_r = .32 \quad \sigma_r = .13$$

We run 10,000 simulations and graph in the chart below four elements of the distribution obtained: the mean, and the 90th, 95th and 99th percentiles.

Box 7

APPLICATION OF CAPITAL REQUIREMENTS TO COVER COUNTERPARTY RISK UNDER BASEL II

Under the Basel II international capital framework, incorporated in European law through the Capital Requirements Directive, minimum capital requirements for counterparty risk in OTC derivatives are calculated by applying Basel II rules on credit exposures.

The major difficulty in applying these rules to counterparty risk is the computation of exposure at default (EAD), given the uncertain nature of exposures arising from derivative transactions and the complexity associated with the calculation of future exposure distribution.

For OTC derivatives, there are three permissible methods of calculating EAD. They are, in order of sophistication, the current exposure method, the standardised method and the internal model method.

In each of these methods, EAD is calculated at the netting set level – i.e. grouping together all transactions with a single counterparty, provided that they are the subject of a legally enforceable bilateral netting agreement that satisfies certain minimum legal and operational requirements.

Current exposure method

Under the current exposure method, EAD is computed as follows:

$$\text{EAD} = \text{RC} + \text{add on}$$

RC is the current replacement cost and “add on” is the estimated potential future exposure. For a single transaction, the add on is calculated as the product of the transaction’s notional value and the “add on factor”, which is taken from the regulatory tables on the basis of the remaining maturity and the type of underlying risk factor (interest rate, foreign exchange, equity, etc.).

For a portfolio of transactions covered by a bilateral netting agreement, RC is the net replacement cost across the derivative contracts in the netting set (either the net portfolio value or zero, whichever is larger). However, a limit is set when banks are allowed to reap the benefits of netting in the form of a cap on the amount of offsetting between transactions.

Finally, for collateralised counterparties, EAD is computed taking into account the value of the collateral received, with adjustment for expected volatility.

Standardised method

The standardised method was designed for banks that are not qualified to model counterparty exposures internally, but would like to adopt a more risk-sensitive approach than the current exposure method.

Under the standardised method, banks compute EAD for derivative transactions within a netting set as follows:

$$EAD = \beta \cdot \max[NCV; \sum_j NRP_j \cdot CCF_j]$$

β is a multiplier; NCV is the current market value of all transactions in the portfolio, net of the current market value of collateral assigned to the netting set; NRP_j is the absolute value of the net risk position for the subset j of similar transactions (in terms of risk factors, currency and maturity); and CCF_j is the credit conversion factor for the same subset, which converts the net risk position into a PFE measure.

The exposure amount for a given counterparty is then the sum of the exposure amounts or EADs calculated across the subsets of transactions that could hedge each other. Compared with the current exposure method, the standardised method provides banks with much more room to exploit the benefits of netting.

Internal model method

The internal model method is intended to provide incentives for banks to improve their measurement and management of counterparty risk. Under the internal model method, both EAD and the effective maturity are removed from the outcomes of banks' internal future exposure models once they have been approved by bank supervisors.

As with the other methods, EAD is calculated at the netting set level under the internal model method. However, by contrast with non-internal methods, cross-product netting is permitted, so the calculation of EAD benefits from full netting.

Under the internal model method, EAD for a given netting set is calculated as follows:

$$EAD = \alpha \cdot \text{Effective_EPE}$$

Effective EPE is the expected exposure calculated over a horizon of one year, factoring in the replacement of deals with shorter maturities with new ones; α is a multiplier.

A multiplier is needed to address the deficiencies arising from the decision to model the market risk governing EAD and the credit risk of each counterparty separately. Currently, alpha is set at 1.4, but banks could ask their national supervisors to allow them an internally estimated alpha with a floor of 1.2.

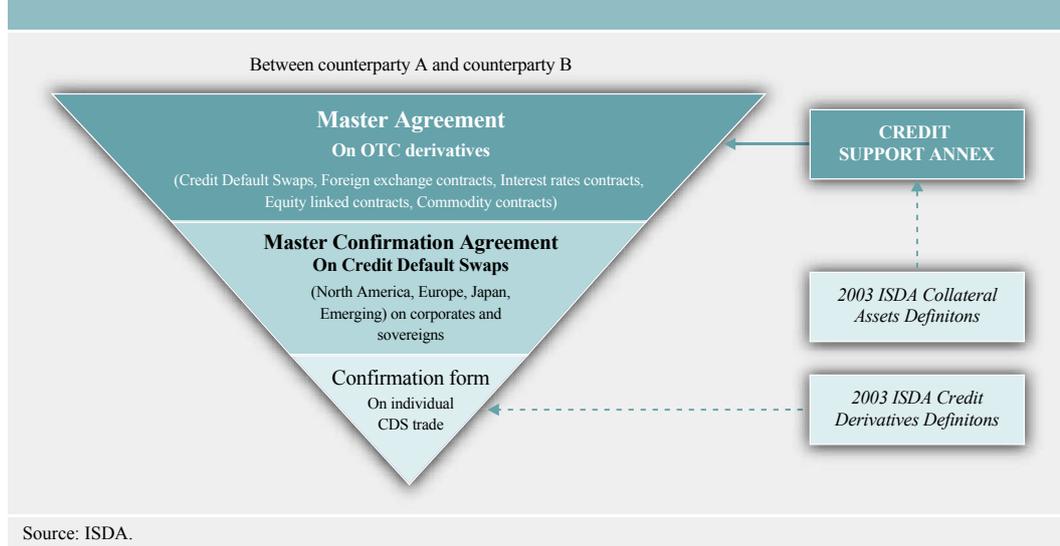
5.3 BILATERAL NETTING

Where two counterparties – dealers, for instance – negotiate a large number of contracts with each other, assessing the credit exposure of one counterparty against the other could become highly complex, since calculating the PFE may

mean considering hundreds of contracts at each stage.

The ISDA Master Agreement has become the industry standard for OTC derivative transactions. Under the Master Agreement, all transactions netted are documented on the basis

Chart 5.1 ISDA collateral framework



of trade confirmations.²⁸ The Master Agreement is an “umbrella” contract governing those trade confirmations. This arrangement allows parties to an ISDA Master Agreement to aggregate all related liabilities and claims against a given counterparty, resulting in a single net amount payable by one party to the other. Reciprocal credit exposures arising from the marking to market of different OTC derivative transactions documented under an ISDA Master Agreement with the same counterparty can thus be netted against each other, which is especially beneficial when counterparties have entered into multiple transactions, such as interest rate swaps, currency swaps, equity derivatives and CDSs.

Where the ISDA Master Agreement is supplemented by a credit support annex (CSA), the net amount of money that one counterparty owes to the other is collateralised in accordance with the terms and conditions of the collateral arrangement. The main features of such an arrangement are the frequency with which the net credit exposure is calculated and the minimum threshold that is to be reached before a collateral transfer is due.

As mentioned in Chapter 3, net notional amounts for CDSs represent the maximum amount of funds that can be transferred from sellers

to buyers in the event of the reference entity defaulting, assuming a recovery rate of zero and an absence of collateral arrangements.

In the event of a default by a counterparty, all attached transactions may be terminated and the net outstanding obligations netted down to a single payment (“close-out netting”). The close-out netting of positions ensures that only the net exposures of an OTC derivative portfolio are payable, less any collateral posted, and prevents counterparties or trustees from cherry-picking as regards their obligations towards a counterparty. It should, however, be noted that the ISDA Master Agreement nets only credit exposures arising from OTC derivative trades, whereas banks may have numerous different forms of exposure to the same counterparty. Moreover, as banks typically comprise groups of legal entities that sometimes trade autonomously in OTC derivatives, aggregating credit exposures against a defaulting counterparty at group level is not straightforward, especially when that

²⁸ 19 EU countries have adopted legislation on netting. Since 2004, however, the ISDA and the European Financial Market Lawyers Group have been suggesting that the European Commission consider introducing an EU-wide instrument to harmonise the legal regime for close-out netting and set-off across all EU Member States, as EU law does not yet have a uniform definition of close-out netting or set-off.

counterparty itself comprises a group of firms with activities in various jurisdictions.

Thus, it may be worthwhile for regulators to give further consideration to the feasibility and usefulness of expanding netting opportunities for banks within a legal framework across different forms of exposure. A recent development has seen netting carried out in a limited number of cases across repo and OTC derivative exposures against individual counterparties where ISDA contracts enable the pooling of collateral across these different asset classes. Being relatively new, however, this approach still faces some legal obstacles and is not deemed an alternative to the adoption of CCPs by market participants.

The defaults of US and European firms in 2008 and 2009 have typically confirmed the general legal robustness of the ISDA Master Agreement framework as regards close-out netting, but the real test of the robustness of this arrangement was the default of Lehman Brothers, which was a major participant in the OTC derivative market.

5.4 MULTILATERAL TERMINATION

One way of reducing operational risk is multilateral termination across multiple market participants. This is also referred to as “compression”, “termination” or “tear-ups”. Multilateral termination is a process that identifies “redundant” trades that can be removed from a bank’s books without changing its market risk profile. This reduces the notional value of the bank’s derivatives and hence its exposure to operational risks. TriOptima and Creditex/Markit provide this service for CDSs, supported by the DTCC.

Many banks actually have no directional risk on a net basis, having instead a number of equal and opposite offsetting trades on their books.

In June 2009 major dealers committed themselves to continuing with the aggressive compression of inter-dealer portfolios and began

compression cycles of 15-20 reference entities per week in the United States and Europe, with monthly cycles of index trade compressions. The results of these processes are shared with supervisors.

TriOptima runs quarterly termination cycles for single-name CDSs and monthly cycles for CDS indices. It announced the compression of USD 30.2 trillion of CDS contracts in 2008 and USD 5.5 trillion of CDS contracts in the first three months of 2009. Compression services are also offered by Markit and Creditex, which led to the tearing up of USD 2.3 trillion of CDS contracts in 2008. This is reflected in the gross notional amount of outstanding CDSs, which declined significantly in 2008.

It should be noted that the majority of those terminations (USD 28 trillion) concerned CDS indices, as practical issues surrounding the termination of single-name CDSs remain. As trade compression cycles require a certain degree of standardisation in order to maximise the potential of the termination, the adoption of standardised North American and European single-name contracts in April and June 2009 respectively will increase the potential of such termination cycles.

The monitoring of such termination activities is important in order to assess the scale of credit risk transfers. Thus, the continued support of the providers of these services via enhanced disclosure to regulators should be encouraged.

5.5 COLLATERALISATION

Collateral management is an additional risk management tool which complements the benefits of netting as regards the management of counterparty risks. Collateral provides the in-the-money counterparty with the funds that would allow it to replace the terminated transaction if its counterparty were to default. It is important to note that this collateral is available even if the in-the-money party is the defaulting entity. This practice is potentially

more important for the management of bilateral exposures between dealers and non-dealers, as non-dealers may not have the same netting possibilities as dealers.

CDS contracts which are entered into under the ISDA Master Agreement and supplemented by a CSA are subject to collateral posting arrangements, in accordance with two principles.

First, the collateral to be posted is calculated on the basis of the aggregated value of the portfolio of transactions covered by the ISDA Master Agreement, not on the basis of any individual transaction or category of OTC derivative exposure.

Second, the posting of collateral is dynamic, with regular collateral rebalancing and the posting of any additional collateral on a daily or weekly basis.

ISDA CSAs also set out other details of collateral arrangements, containing, inter alia, information on the threshold for uncollateralised exposures, the use of one-way versus two-way collateral,²⁹ rehypothecation and the eligible collateral instruments (generally cash and sovereign or agency debt instruments).

It is possible that the total amount of collateral posted increased in 2008 as a result of a spike in market volatility and CDS spreads, which significantly increased the market values of outstanding derivatives. In the presence of reduced rehypothecation and rising costs for cash collateral, this may have resulted in a significant liquidity drain for the dealers and other market participants that had to raise and provide that collateral.

²⁹ A CSA may stipulate that collateral is to be posted by only one party, or by both parties. One-way collateral agreements are generally the exception.

Box 8

THE ROLE OF COLLATERAL

The role of collateral is to compensate for the “loss given default” following the netting of bilateral positions. For instance, collateral is provided by Counterparty A to Counterparty B, which has a positive derivative claim against Counterparty A. The collateral is used to cover the cost that Counterparty B would incur through the replacement of the trade if Counterparty A were to go bankrupt. Collateral management is handled not on a product-by-product basis, but on a counterparty basis and is posted against the net residual exposure across all of the OTC derivative trades documented under a single ISDA Master Agreement.

Collateral arrangements are governed by a standard annex¹ to the Master Agreement known as a “CSA”. CSAs can be described as granting either a full title transfer (CSA under English law) or a pledge transfer/security interest (CSA under New York law or English credit support deed).² The ISDA support documentation for collateralisation (as opposed to a bespoke collateral agreement) was chosen by 87% of market participants in the ISDA’s 2009 Margin Survey. CSAs set out collateralisation rules that apply to the entire portfolio of OTC derivatives. They are

¹ Except in the case of an English credit support deed.

² Market participants can choose between five standard forms of ISDA CSA, depending on the law governing the region in which the CDS is traded and on the type of collateral transfer chosen: the 1994 CSA under New York law (pledge transfer); the 1995 CSA under English law (full title transfer); the 1995 credit support deed under English law (charge); the 1995 CSA under Japanese law; and the 2001 margin supplement (which enables market participants to select the collateral framework to be applied to their entire set of transactions, with a choice between New York law and English law). New York law was the most frequently used in 2008, with 60% of CSAs taking that form. The CSA under English law was used in 25% of cases. (Source: ISDA Margin Survey 2008.)

based on standardised definitions published by the ISDA (2003 Collateral Asset Definitions) and include all the key agreed contractual terms related to collateral margin calls and exposure calculations, including details of the frequency with which collateral is to be posted, a definition of eligible collateral, details of thresholds and minimum transfer amounts, the requirements for initial margin calls, etc.

According to the ISDA's 2009 Margin Survey, 80% of participants have increased their use of cash collateral, while non-cash collateral consists mainly of government securities denominated in US dollars or euro – for which haircuts are applied, depending on the security's underlying credit risk.

Collateral requirements sometimes constitute an initial margin deposit (also called the “independent amount”) or regular margin calls (also referred to as a “variable margin”). The independent amount can be related to the credit quality of the counterparty and the terms of the transaction and will be held for the life of the trade (although it can sometimes be netted with a variable margin).

Inter-dealer transactions are generally not subject to initial margin requirements, although this practice has become more common for hedge funds. This practice has also become more widespread during the financial crisis, which has increased the total amount of collateral in use. That being said, such increases have been partially offset both by the smaller number of underlying trades for which collateral is required and by the practice of netting with a variable margin.

The frequency of regular collateral margin calls can range from daily to biannual. Payments are often more frequent for riskier exposures. Collateral margin calls cover changes in mark-to-market values, following the bilateral netting of positions across the entire portfolio, in the event that the residual exposure exceeds a given threshold. The rating of the counterparty can determine this threshold, which can range from zero to large amounts.

Under a full title transfer, the recipient of the collateral can, subject to a bilateral agreement between the parties, use that collateral without restriction. Ownership of the collateral covering the exposure is transferred, with the requirement that the collateral's recipient deliver equivalent assets when the exposure is reduced. In this case, the collateral provider is unsecured for any excess claims after close-out netting if its counterparty defaults. Moreover, in the event of the insolvency of the secured party, the collateral received becomes part of its own assets. With a pledge format, the collateral is transferred to the recipient, but the provider still owns the collateral. A security interest is granted in the collateral covering the exposure, with the requirement that the recipient of the collateral release the collateral subject to the security interest when the exposure is reduced. In that case, the collateral provider deposits cash or securities in an account held by the securing party with the collateral provider, and the collateral does not become part of the insolvency estate of the secured party. Thus, in the event of the insolvency of the recipient of the collateral, a full title transfer provides less security to a party transferring excess collateral.

The practice of reusing posted collateral in another transaction has become extremely widespread and is generally referred to as “rehypothecation”. Collateral can be rehypothecated under both of the above CSA standards, but with pledge transfers there is a limit of 140% of the collateral provider's debit balance, including initial margins paid. Rehypothecation can generate a

liquidity risk for the collateral provider through excess collateralisation as a result of either a lag in collateral delivery or haircuts on securities posted as collateral. Such haircuts are usually discounted for risk and result in the provider having to transfer collateral that exceeds its negative mark-to-market exposure. Limits on rehypothecation reduce leverage and related risks within the financial system.

For example, imagine the collateral transferred by Party A to Party B takes the form of short-term government securities. If the trade is terminated, Party B will need to return to Party A an equivalent (though not necessarily identical) amount of short-term government securities. However, if Party B has reinvested/rehypothecated the original securities in acquiring, for example, long-term asset-backed securities, Party B may not be able to liquidate these securities in a timely manner in order to buy the original securities in the market and return them to Party A. This requirement introduces timing, liquidity and pricing issues into the transactions. In addition, collateral is posted where one party has a negative market value in all of its derivative positions against a particular counterparty. Since derivative prices can change quickly, the market value can change rapidly and the amount posted can quickly exceed total exposure – i.e. the position becomes over-collateralised. This happened in the case of Lehman Brothers, and at least one market participant was unable to retrieve its over-collateralised portion owing to Lehman Brothers' rehypothecation.

In the aftermath of Lehman Brothers' bankruptcy, there has been a strong reduction in the use of rehypothecation,³ and collateral transfer arrangements have shifted towards pledge-based agreements to restrict the use of cash collateral as a temporary liquidity source for the holder of the account in which the cash is deposited. This increase in pledge-based agreements was reported by market participants in the qualitative survey. Although this increase cannot be observed in the most recent ISDA Margin Survey, which reported that the share of pledge-based agreements decreased from 60.0% to 57.8% in 2008, there has nevertheless been a noticeable increase in pledge-based agreements since 2006 (when their share stood at 52.8%).

3 M. Singh and J. Aitken (2009), "Deleveraging after Lehman – Evidence from reduced rehypothecation", IMF Working Paper 09/42.

In the CDS framework, the protection buyer is the recipient of collateral when spreads are widening, while it is the other way round when spreads are declining.

When assessing the risk-mitigating role played by CSA-based margin call schemes, one should bear in mind that the mitigation of risk is somewhat more limited for CDS than for other OTC derivatives, due to the possibility of the CDS spread widening too quickly, resulting in a positive claim on the CDS-selling counterpart remaining unsecured until the next margin call. This is not the case with CDS indices, where the diversification offered by the index smoothes out the effect of idiosyncratic developments.

From a counterparty risk perspective, there is therefore the risk, with a single-name CDS, of an unforeseen credit event occurring prior to the orderly repricing of the credit risk, with the result that CDS spreads widen sharply. Lehman Brothers' default was a classic example of such jump-to-default risk, which, from the point of view of the protection buyer, negated much of the risk-mitigating role of the collateral posted by protection sellers until the US dealer filed for bankruptcy protection.

The amount of collateral that the protection seller is required to provide at short notice may, in some cases, be close to the notional value of the contract and may therefore exceed that

party's short-term liquidity capacity, thereby triggering a liquidity crisis.

Moreover when assessing the effectiveness of collateralisation practices, one should note that calculating margin and collateral amounts can be difficult, given the challenges associated with determining the fair value of the most complex derivatives, as well as the value of the reference asset. What is more, the bilateral collateral and margin requirements for OTC derivatives do not take into account the counterparty risk that each trade imposes on the rest of the system, allowing systemically important exposures to build up without sufficient capital to cover the associated risks.

5.6 COLLATERALISATION PRACTICES: A GLOBAL ASSESSMENT

ISDA MARGIN SURVEY

The dominant source of the nature and extent of bilateral collateral is the ISDA's Margin Survey. ISDA has conducted this survey analysing the use of collateral as a way of mitigating credit exposures arising from OTC derivatives. The survey results indicate a sharp increase in the use of collateral in the last ten years: according to the ISDA's findings, two-thirds of the net credit exposures derived from OTC credit derivatives were collateralised at the end of 2008, compared with one-third in 1999. The use of collateral for credit derivatives has remained relatively stable over the past three years, even given the recent financial market turmoil (see Table 5.1).

When assessing this figure, it is important to note the following aspects.

Table 5.1 Amount of collateralised exposure

(percentages)						
	2008	2007	2006	2005	2004	2003
OTC derivatives	66	65	59	63	55	52
CDS	66	66	66	62	58	39

Source: ISDA Margin Survey 2009.

First, the survey's over-representation of large dealers, which account for the bulk of the transactions in the market, could result in a strong positive bias. On the other hand, it is also possible that the ISDA figure reflects the inclusion of non-collateralised trades between the various affiliates of US primary dealers.

Second, anecdotal evidence from large dealers suggests that, following Lehman Brothers' failure, inter-dealer exposures are currently almost fully covered by collateral agreements. This evidence is only compatible with the information provided by the ISDA survey if most exposures between dealers and non-dealers are not collateralised.

Third, it is important to bear in mind that collateralisation will never reach 100% of ISDA survey participants' aggregated exposures given the mechanics of CSAs, which allow for the existence of limited unsecured exposures and set minimum transfer amounts. In addition, governments and their affiliated entities (such as central banks) do not typically use CSAs, and neither do non-financial corporations as well as insurance companies.

Despite not being sizeable in terms of the aggregated net market value of their exposures, uncollateralised entities could still prove to be a concern for financial stability given the high degree of interconnectedness in the market. Regulators may therefore have an interest in identifying the entities that currently have non-collateralised counterparty risk.

Fourth, the ISDA Margin survey may not provide a full picture of the market owing to the reduced number of respondents in 2008 (67 in that year, down from more than 100 in 2007), as well as the non-inclusion of large CDS net sellers. The difficulty of using the ISDA results to assess the degree of collateralisation in banks' OTC exposures is confirmed by the recent findings of the US Office of the Comptroller of the Currency. The OCC has reports that US commercial banks that trade in OTC derivatives have collateral covering 30-40% of their net current credit exposures. A review of several

individual institutions' answers to the ISDA Margin Survey indicate high disparities among banks as regards collateral margining practices, depending also on the counterparty. Further enhancement of data quality assessment procedures for voluntary responses may be warranted to enhance the ISDA's survey as an overall market indicator. For the sake of this report, given the voluntary nature of the ISDA Margin Survey data participants and limited data quality assessment possibilities of responses for the ISDA, the survey results have mainly been considered to reflect main trends, in particular within the inter-dealer markets.³⁰

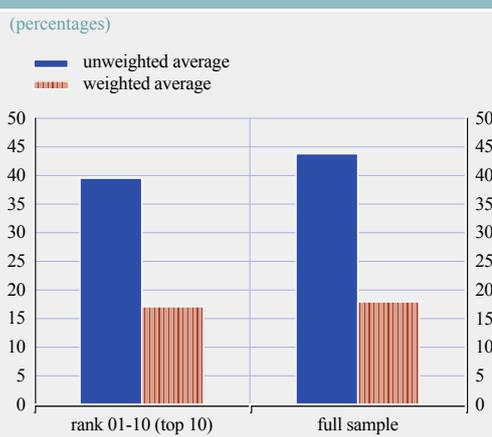
BSC SURVEY OF MARKET PARTICIPANTS

In order to fill gaps in the BIS and DTCC data, the BSC undertook a survey for the sake of this report of EU banks' exposures related to CDS and OTC markets. A quantitative and qualitative questionnaire was circulated to 31 banks in seven EU countries (France, Belgium, Germany, Italy, the Netherlands, the United Kingdom and Spain). The quantitative survey was complemented by the collection of financial data on the polled institutions (total assets, total equity and tier 1 capital). The survey focused on measuring counterparty risk, particularly in regards to counterparty concentration, and on the collateralisation of counterparty exposures in terms of market values as at the end of December 2008.

The qualitative questionnaire was also circulated to Fitch, Standard & Poor's, Moody's and CreditSights in order to obtain the views of external credit analysts as regards the main concerns and issues within the CDS market. This generally yielded very detailed and useful feedback.

In the quantitative survey, each bank was asked to indicate, in percentage terms, the extent to which its gross positive market value exposures from OTC derivatives were collateralised. For the full sample, the answers obtained showed that banks collateralised an average of 44% of their exposures, a figure substantially lower than

Chart 5.2 Collateralisation of positive net market exposure



Source: BSC.

the 66% quoted in the ISDA's 2009 Margin survey for market participants worldwide (see Chart 5.2).

The low level of collateralisation for EU banks responding to that survey may, in part, be due to the fact that dealers are more strongly represented in the ISDA survey, given the full collateralisation of net inter-dealer exposures. By contrast, the banks participating in the survey tend to be commercial banks, which may not interact with other dealer banks.

As commercial banks, they are doing business on behalf of their corporate clients such as corporations for which collateral posting have not been required to the same extent as for dealers so far. Corporations may also have limited back office capabilities or may legal limitations such as loans contracts/covenants which may limit their ability to signing CSAs.

Furthermore, some CDS counterparties, in particular monolines, do not post collateral for outstanding CDS contracts and the increased

³⁰ The ISDA repolled the primary dealers for the ISDA Margin survey in support of this report, following data quality checks on national responses by the BSC.

market value of CDS contracts have likely contributed to lower collateral ratios for European banks with exposures to these counterparties.

In addition it can be noted that insurance companies would have to deduct collateral from its eligible assets, in most cases constituting high quality assets, such as cash, which would serve as a disincentive for signing CSAs. It can also be noted for insurance companies that the margin call mechanism may not be considered safe, as the insurance company's policy holders may, in any case, retain the senior rights to the company's assets in the event of bankruptcy.

As collateral coverage is measured by the ratio of the value of collateral compared with OTC derivatives exposure, the relatively low percentage of collateralization for survey respondent EU banks may be due to a sharp increase in the market value of CDS contracts given the increased market volatility, in particular during the second half of 2008.

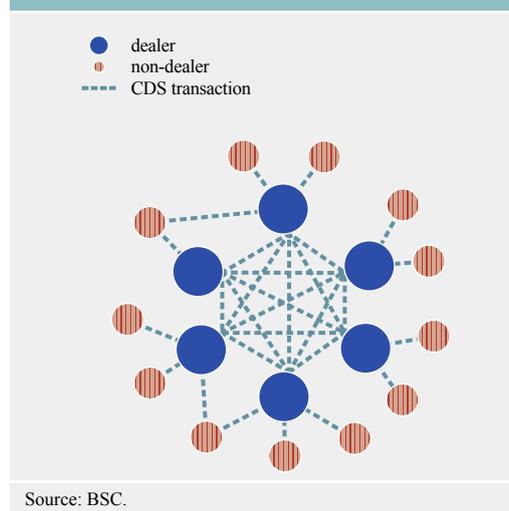
Finally, BIS data show that hedge funds which are typical users of collateral are less important counterparts to EU banks than they are in the United States.

Generally speaking, the current degree of collateralisation by EU banks appears to be lower than that indicated by the ISDA Margin Survey, but comparable to levels observed in the United States. Contributory factors may include non-collateralised exposures to certain non-financial players and historical exposures to non-collateralised CDS contracts. The development and fostering of collateral usage by non-bank players is therefore an area which may benefit from further consideration by regulators.

5.7 CONCLUSIONS: A CENTRAL CLEARING COUNTERPARTY FOR CDS

As noted earlier, counterparty risk is the risk that, owing to one of the parties defaulting, the position

Chart 5.3 Topographical representation of the structure of the bilateral market



Source: BSC.

is terminated and one of the counterparties is left out of the money, as the original in-the-money position has been terminated.

There are three main ways of better addressing counterparty risk: using a central clearing counterparty; enhancing bilateral collateral management processes; and ensuring appropriate capital to cover the residual counterparty risk.

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. A CCP, which acts as a seller to every buyer and a buyer to every seller, does away with the web of counterparty relationships that exist in the bilateral market, albeit at the cost of concentrating much of the systemic risk in a central location (see Chart 5.3).

Box 9

EFFICIENCY OF CCPs

Gauging the impact that introducing CCPs would have on counterparty exposures and collateral requirements is very difficult. As indicated, large banks currently have many different forms of bilateral netting agreement, and these already reduce counterparty exposures by allowing cross-product netting.

According to the work of some academics (D. Duffie and H. Zhu, 2009), were an instrument-based CCP to be established (for instance one that specialised in CDS), the effect of that cross-product netting would be lost, reducing the efficiency of netting and leading to an increase in collateral demands. The magnitude of such an effect is dependent largely on the importance of the derivative class cleared through the CCP relative to other instrument classes. Duffie and Zhu have showed, using an abstract model, that the expected exposures created by the CDS market are not large enough to justify a dedicated CCP from the point of view of the efficiency of netting.

They show that establishing such a CCP would not increase the efficiency of the netting of the financial system as a whole (measured as total expected counterparty exposure post-netting), as the contribution that CDSs make to aggregate expected counterparty exposure is low by comparison with other derivative classes, even taking into account the jump-to-default risk posed by CDSs.

Were this analysis to accurately reflect the actual contribution made by CDSs to systemic counterparty risk, the benefits of setting up a specialist CCP would be limited, as the lost opportunities for bilateral netting across derivative classes would outweigh dealers' gains from multilateral termination in CDSs. As a consequence, collateral demand would increase.

According to the authors' analysis, things could get worse were more than one CCP specialising in CDSs to be established, each focusing on specific subsets of the CDS market or offering services to dealers based in a specific geographical region.

From this point of view, the optimal result, viewed in terms of the efficiency of netting, would be to have a single CCP clearing CDSs, together with other types of OTC derivative (mainly interest rate derivatives) and servicing a broad range of dealers.

However, a global CCP could lead to systemic concentration risk, which could threaten financial stability, as stressed by Rama Cont. From a financial stability perspective, the establishment of several CCPs for CDSs would seem preferable. Moreover, these CCPs should also have access to central bank liquidity in the currency in which the products cleared are denominated, and so they should be located in the different monetary areas. Indeed, an adequate risk management framework includes access to central bank liquidity and could, therefore, be related to location and oversight requirements. Indeed, the Eurosystem's consistent policy¹ requiring clearing houses dealing in euro to be located in the euro area is based on the need to ensure that CCPs

¹ See <http://www.ecb.int/press/govdec/otherdec/2008/html/ge081219.en.html>; and http://www.ecb.int/press/pr/date/2001/html/pr010927_2.en.html

have direct access to central bank credit operations and that central banks can effectively oversee CCPs.

A number of CCPs are currently being developed in parallel in different monetary areas. Given the broad political support for specific CCP initiatives, the focus should currently be on ensuring that the stand alone CCPs are robust and efficient with a capital and regulatory structure which will minimise risks to financial stability. In addition, it should be recognised that CCPs offer the benefits of consistent risk management under regulatory oversight.

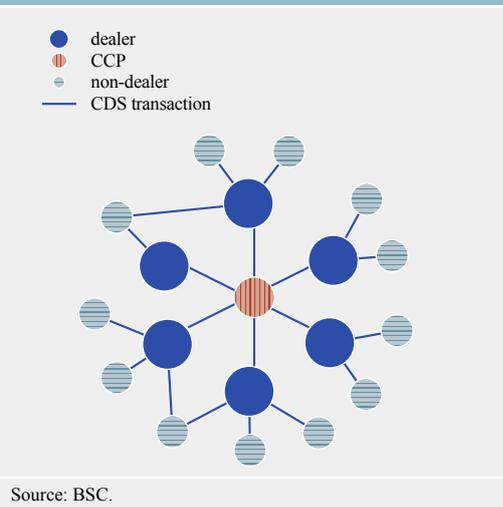
On 16 July 2009 the Governing Council of the ECB also reaffirmed the systemic importance of securities clearing and settlement systems and welcomed the progress made towards the introduction of central counterparty clearing facilities for OTC credit derivatives, in line with its decision of 18 December 2008 and its earlier statement of September 2001 on central counterparty clearing. The Governing Council also confirmed the importance of having at least one CCP clearing facility for OTC credit derivatives located within the euro area. In this context, particular priority will be given to the use of euro area infrastructures for clearing credit default swaps denominated in euro, which will be closely monitored by the Eurosystem in the coming months.²

2 <http://www.ecb.int/press/govcdec/otherdec/2009/html/gc090717.en.html>

With the introduction of a CCP, all cleared transactions would be between a clearing member and the CCP. Thus, having a CCP removes the requirement for clearing members to manage their counterparty exposure to other individual clearing members on a bilateral basis (see Chart 5.4).

Instead, each clearing member has only one relationship to manage (i.e. its relationship with the CCP). Firms are exposed only to the risk of the CCP defaulting. Currently, CCPs are perceived to be a “safe” counterparty and are given zero exposure under capital rules – although this is currently under review.

Chart 5.4 Topographical representation of the structure of the market following the introduction of a central clearing counterparty



Non-dealers, however, will probably be unable to participate directly in the clearing house owing to capital limits and other criteria established by the clearing house as a means of managing the risk of a clearing member defaulting. Non-dealers will, however, be able to trade with a clearing member, which may be able to pass the benefits of clearing members on to the non-dealer via the segregation of margins and the portability of contracts. However, there are a number of non-trivial legal issues that will need to be addressed before this becomes widespread.

The CCP qualifies as a safe counterparty by protecting itself from losses incurred as a result of defaults by clearing members. It does so by imposing a consistent, robust risk management framework for all of its members, rather than negotiating individual relationships on a bilateral

basis. Such risk management typically includes initial and variation margining and contributions to the default fund by each member. The method by which each of these is calculated is clear to the clearing members.

If a member defaults, the CCP typically allocates the loss first to the members' own margin contributions and then to the default fund (with the defaulting member's contribution potentially being targeted as a matter of priority). This second step effectively mutualises the residual loss from a member's default, sharing it out across clearing members, rather than having losses concentrated in one non-defaulting member. The "waterfall" structure for the allocation of losses can vary from CCP to CCP. For example, in some cases the CCP itself also makes a contribution to the default fund.

However, if the CCP were found not to have sufficiently robust risk management and were consequently to fail as a result of a clearing member's default, it would create a centralised source of systemic failure. It is therefore vital that there be appropriate supervisory oversight in order to ensure, inter alia, that a CCP's corporate governance and risk management frameworks are robust. This is especially important with regard to the size of clearing members' margin requirements and default funds and the maintenance of these requirements in periods of stress.

6 CDSs AND THE CREDIT CYCLE

It has been suggested that credit derivatives, in conjunction with other forms of risk transfer, may have fostered the expansion of – and access to – credit, which many commentators cite as one of the underlying causes of the crisis. A different argument can be made in relation to credit derivatives' role in setting the marginal cost of credit for firms. Some argue that these may be increasing the cost of credit for some firms, as new issues may be being priced relative to CDS spreads, and these, in turn, may affect credit ratings.

Given their nature, CDSs may also be important in assessing financial stability and may have important cross-market interlinkages. One of the results of the severe crisis in the financial sector has been the need for governments in Europe and around the world to try to mitigate the risks that have threatened to engulf the global financial system. This has had knock-on effects on sovereign creditworthiness in terms of credit ratings and risk perception, which can have systemic implications.

This chapter outlines the ways in which CDSs affect banks and the wider financial system. It draws on market and academic research, on interviews and on feedback from market participants. The chapter first focuses on banks' CDS use and then discusses funding costs and implied credit ratings. It then moves on to look at the financial stability indicator properties of CDSs and considers some aspects of sovereign CDSs. Finally, it draws conclusions and makes some recommendations for further work.

6.1 CDS USE BY BANKS: HEDGING AND TRADING ASPECTS

Credit risk transfer techniques can allocate risk to investors with differing time horizons, liability structures and risk tolerance. It is, however, important to understand, given the existing capital adequacy framework, how and why banks use these instruments. It is also important to investigate their effects in terms of

the risk profile and the nature and type of risk in the financial system as a whole.

This section outlines the way in which CDSs interact with the existing capital framework for the regulation of banks and explains why banks use CDSs and other structured credit instruments to manage their balance sheets and hedge credit risk exposures.³¹

Neatly distinguishing the use of CDSs for hedging purposes from their use as a synthetic credit trading instrument is difficult for various reasons. The classification of CDSs as one or the other depends on the nature of the underlying asset exposure and where the CDS is booked. This is complicated by the lack of sufficient comparable data for banks with similar business models. It is therefore better to regard banks' use of CDSs as part of a continuum, rather than as an "either ... or" situation.

If the underlying asset is a loan granted by the bank, the bank may want to both price the loan and hedge it, either partially or fully, using a CDS. By contrast, if it were a bond held as part of a trading strategy, the bank could hedge it using a CDS. However, if a cash exposure to a leveraged loan were hedged using a CDS or a synthetic credit position was taken in the leveraged loan, the distinction between the credit risk in the banking and trading books would no longer be so clear cut. This is not a new issue, as banks have held cash-based structured credit instruments in both their trading books and their banking books for quite some time. This has also been noted by the Joint Forum, among others.³²

Why would a bank hedge the credit risk in this loan or bond using a CDS? In short, the use of CDSs, by transferring credit risk off the banks' balance sheets (as is the case with other credit

³¹ A cross-jurisdictional review of regulatory capital and the treatment of CDS protection on bank loans in terms of disclosure was provided in the Joint Forum's "Report on Credit Risk Transfer" (2005) and the updated report in April 2008.

³² See the Joint Forum's "Report on Credit Risk Transfer" (op. cit.). See also Prato, O. (2006), "Better capturing risks in the trading book", Financial Stability Review, Banque de France.

risk transfer instruments), reduces regulatory capital requirements for the bank on those assets (see Box 10).

Banks may have other reasons for using CDSs to manage credit exposures. For example, the growth of such active credit portfolio management techniques could lead to the better pricing of risk at origination. In addition, the previous static limits based on debtor ratings, geography or sector could usefully be supplemented by market pricing. Moreover, engaging in single-name hedging, portfolio insurance and other risk mitigation techniques could improve the resilience of banks.³³

The second reason for thinking of CDS use by banks as a continuum is that it depends on where the instrument is booked by the bank. Continuing the earlier example, if a loan was to be held for a period of time and hedged using a CDS, it could be placed in the banking book for regulatory capital purposes. On the other hand, a package comprising a bond and a CDS might be recorded in the trading book, if it were held with trading intent.

The current crisis has shown that these neat distinctions employed in order to allocate exposures to various regulatory categories fail to reflect some of the risks incurred by banks in running their businesses. For example, there is a discrepancy between economic and supervisory capital in the case of structured credit products, indicating that regulatory capital requirements may have been too low

for credit exposures, especially if they were held in the trading book.

This excessive discrepancy was recognised by the Basel Committee, which recently changed the treatment of structured credit positions held in the trading book, reducing the favourable capital treatment they have received until now.

More recent research for Europe has focused on the coherence of the interaction between the economic capital and supervisory capital required for tranching structured products. In particular, one study, which covers the turmoil period and uses the iTraxx and a commonly used industry rating model for these transactions (Fitch's Vector CDO model) as a benchmark, has shown that the charges applied by the Ratings-Based Approach do not fully cover the economic risk of the tranches.³⁴ The gap is largest for the lowest rated or unrated portions of the synthetic CDO structure, where most of the credit risk lies. When capital is calculated using banks' internal models, the ratings-based prudential requirements fall short of economic capital absorption (for mezzanine tranches, the economic capital could be as much as 15 times the current prudential requirements), mainly owing to increasing default correlation.

³³ However, one finding from contact with market participants is that many banks that actively engage in the management of risk through active credit portfolio management consider that their ability to use credit derivatives as a hedge in accounting terms is limited by the need to meet the strict conditions governing hedge accounting. Those conditions are outlined in IAS 39 and SFAS 133.

³⁴ See Giaccherini, L. and G. Pepe, "How secure are ratings?", Risk Magazine, September 2008.

Box 10

TREATMENT OF CDSs AS REGARDS BANKS' REGULATORY CAPITAL

As mentioned in Box 5 and Box 7, there are various capital requirements for credit, market and counterparty risk under the Basel II accord.

Under Basel II, a CDS-protected loan is treated for regulatory capital purposes as though it were a loan guaranteed by a counterparty of the quality of the seller of CDS protection, subject to

maturity-matching and other provisions. By using CDSs as credit risk mitigation techniques, banks can benefit from regulatory capital relief under the Basel II framework in two ways.¹

The first is by purchasing CDS protection from a counterparty referencing individual entities in the CDS protection buyer's own loan portfolio. The purchase of a CDS from a third party effectively enables the CDS buyer to replace the credit risk rating of the debtor in the reference loan with the rating of the counterparty selling the CDS for banks which apply the standardised approach for the calculation of regulatory capital requirements.

For banks using the internal ratings-based method, the internal estimate of the debtor's probability of default is replaced with that of the counterparty selling protection. Finally, banks using the advanced version of the internal ratings-based method are allowed to calculate the capital requirement for the original loan using internal estimates for both the CDS counterparty's probability of default and the recovery rate on such exposures.

The second method constitutes portfolio protection. This involves the purchase of CDS protection on loan portfolios through bespoke multi-name CDS contracts within a synthetic CDO, where the originating bank buys synthetic protection on one or more of the CDO tranches. The resulting exposure is regarded as securitisation exposure and handled in accordance with the securitisation framework of Basel II as long as it complies with certain requirements to ensure that it is effective and there is a significant transfer of risk.²

Banks holding ABSs, CDOs, CLOs and other securitisation exposures will generally apply capital requirements in accordance with the ratings-based approach.

Until now, the treatment of these holdings has differed depending on where they are booked: the supervisory framework rules have typically been applied to banking book exposures, while trading book holdings have been treated more lightly in terms of capital requirements.

The recent innovations in the calibration of market risk in the Basel framework will help to reduce these discrepancies in two ways: first, banking book rules for structured credit products will be extended to cover trading positions with limited liquidity, unless a liquid two market already exists; second, for CDS index tranches, banks will, in situations deemed to be recurrent, be asked to adopt demanding terms when modelling default and event risks via a stress-testing approach.

There is a discrepancy between economic and supervisory capital in the case of structured credit products, which indicates that regulatory capital requirements may have been too low for credit exposures hedged using credit derivatives. The Basel framework on the calibration of market risk has therefore been refined, taking into account the joint event and default risk in credit portfolios.

¹ See Basel Committee on Banking Supervision, "Changes to the securitisation framework", January 2004.

² If the securitisation does not meet these requirements, capital requirements for the underlying portfolio are calculated as if that securitisation did not exist.

The final reason for treating banks' use of CDSs as a continuum, rather than as an "either ... or" situation is that there is a lack of information on the exact nature, use and destination of the types of risk transfer employed.

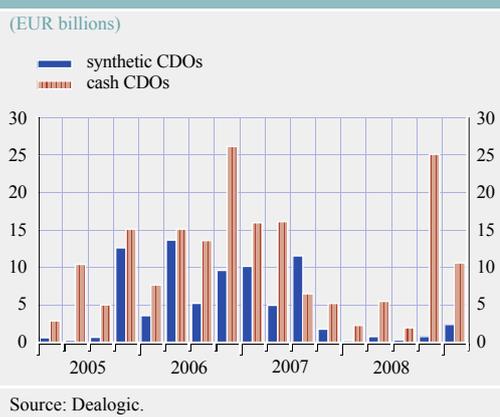
In the United States, one study found that only a small number of large banks use credit derivatives at all and that these banks use them not for hedging, but for trading.³⁵ A different study, based on data on individual loans granted by a sample of US banks, found that obtaining additional credit protection through credit derivatives made banks increase their credit supply to varying degrees, depending on the characteristics of the loans.³⁶

In Europe, banks became focused on managing their balance sheets and improving returns through the use of risk transfer techniques, with credit derivatives being one of the building blocks for balance sheet structures such as synthetic CDOs. One of the advantages of using synthetic structures is that the legal and documentary considerations associated with true-sale securitisation are lessened considerably. One further benefit from banks' point of view may be tax considerations, although this aspect may also carry with it disadvantages from a public policy perspective.

One possible indicator is the amount of cash and synthetic CDOs issued.³⁷ Corporate lending is more conducive to this type of transaction owing to the higher original risk weighting (as opposed to mortgages) and the availability of corporate ratings and possibly market prices through bonds/CDSs in order to price this risk. CLOs may provide a rough proxy for this type of transaction.³⁸ Substantial growth can be seen for this instrument in the years leading up to the crisis (see Chart 6.1).

Moreover, some colour is provided by the public disclosures of AIG Financial Products following its rescue and the subsequent reduction of the risk exposure of AIG and its counterparties. AIG Financial Products was a large seller of

Chart 6.1 European synthetic and cash CDO issuance



CDSs for the above purposes. AIG has claimed in its public financial statements that 72% of the notional amounts of CDSs sold by AIG Financial Products as at December 2007 were used by

- 35 B. Minton, R. M. Stulz and R. Williamson, "How much do banks use credit derivatives to hedge loans?", Dice Center Working Paper No 2008-1, Fisher College of Business, Ohio State University, 2008.
- 36 B. Hirtle, "Credit Derivatives and Bank Credit Supply", Federal Reserve Bank of New York Staff Report No 276, February 2007.
- 37 In a funded synthetic CDO, the SPV sells a portfolio of CDSs to the arranger. Accordingly, the SPV buys some collateral assets against the sold portfolio and, if a bond linked to one or more of the CDSs defaults, it sells part of the collateral to make a payment to the arranger. In order to buy the collateral assets, the SPV has to issue CDO notes to investors, and investors have to pay the principal at the start of the deal. In the meantime, investors receive CDS premia, but risk losing the principal in the event of a default. As in a cash CDO structure, equity tranche investors absorb the initial losses on the collateral assets in exchange for the highest return.
- 38 However, the data that are generally publicly available cover issuance by both euro area and non-euro area residents denominated in major currencies, which makes it difficult to determine where risks are transferred from and to.

Table 6.1 AIG's super senior CDS portfolio

(USD billions; December 2007)	
	Notional amount
Corporate loans ¹⁾	230
Prime residential mortgages ¹⁾	149
Corporate debt/CLO	70
Multi-sector CDO	78

Source: AIG 2007 10-K.
 1) These predominantly represent transactions conducted in order to facilitate regulatory capital relief.

Table 6.2 Notional outstanding amounts covered by monoline guarantees

(EUR billions; first quarter of 2009)

	Deutsche Bank	Société Générale	BNP Paribas	RBS	Crédit Agricole
US MBS	7.3	5.9	2.1	0.1	3.6
Corporate CDO	12.9	3.3	7.9	6.2	8.8
CLO	4.4	10.1	5.5	13.3	3.7
CMBS	7.4	2.2	1.1	5.0	0.7
Others	3.7	2.2	0.3	4.7	0.7
Total	35.8	21.5	16.9	29.4	16.8

Source: Public corporate statements.

European and other banks for capital relief (see also Box 2).³⁹

Data on monoline insurers show that EU banks have in some cases used CDSs underwritten by guarantors for large amounts in order to benefit from their AAA-rated capital relief on structured products (see Table 6.2).

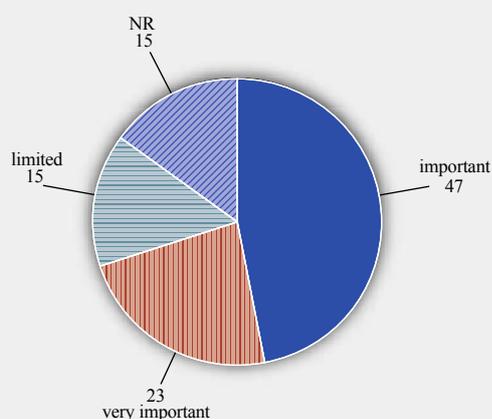
Given the lack of comparable data and mixed findings, a limited qualitative survey of large European banks that use CDSs was undertaken. The answers indicated, overall, that banks used CDSs to mitigate risk, for internal risk management transactions, and to express trading views on behalf of clients and the institutions themselves.

Large banks in particular, indicated that CDSs were an important part of the origination process, as they allowed them to hedge loan or other credit exposures. All regarded them as either “important” or “very important” (see Chart 6.2 and Chart 6.3).

³⁹ “Approximately USD 379 billion (consisting of the corporate loans and prime residential mortgages) of the USD 527 billion in notional exposure of AIGFP’s super senior credit default swap portfolio as of 31 December 2007 represents derivatives written for financial institutions, principally in Europe, for the purpose of providing them with regulatory capital relief rather than risk mitigation. In exchange for a minimum guaranteed fee, the counterparties receive credit protection in respect of diversified loan portfolios they own, thus improving their regulatory capital position.” AIG 2007 Form 10-K, p. 122.

Chart 6.2 Importance of CDSs as a hedging tool in the credit origination process: EU banks

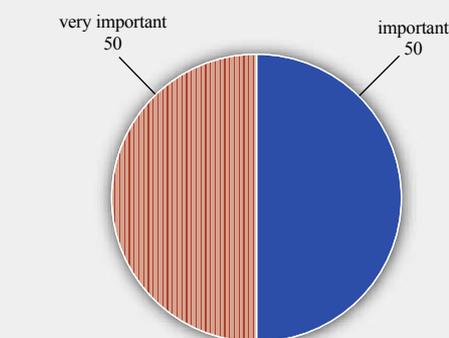
(percentages)



Source: BSC survey.

Chart 6.3 Importance of CDSs as a hedging tool in the credit origination process: Large EU banks

(percentages)



Source: BSC survey.

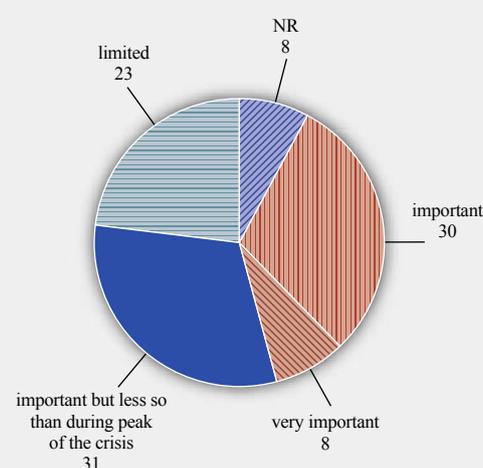
In terms of European banks' ability to hedge primary issuance, a similar picture can be observed. The majority of respondents in the full sample regarded them as important, as did the large banks (see Chart 6.4).

In broad terms, European banks use CDSs in a variety of ways and tend to use them for a combination of purposes, including: the hedging of both loan and cash bond exposures; risk management and the mitigation of credit risk as regards regulatory capital requirements; and trading purposes. The extent, nature and importance of these various activities in terms of banks' balance sheets and the impact on profits and losses cannot presently be determined quantitatively on a pan-European basis.

Thus further data and analysis are important in order to ensure that banks are not replacing one type of risk (i.e. credit risk) with another – counterparty risk. In particular, further studies of balance sheet transactions and active credit portfolio management techniques are warranted, looking at how these types of active credit management interact with banks' risk profiles and IFRS accounting standards.⁴⁰

Chart 6.4 Importance of CDSs for hedging primary issuance in the capital market

(percentages)



Source: BSC survey.

6.2 CDSs, IMPACT ON FUNDING COSTS, AND MARKET-IMPLIED RATINGS

CDS AND BOND MARKETS

Policy-makers and researchers have both expressed concerns, indicating that CDSs have an impact on the cost of debt financing for individual firms through various channels.⁴¹ Three of the possible channels are: diversification, information, and reduced incentives for ex post monitoring.

The diversification effect means that credit risk, whether in loan or in bond form, is now much more tradable than it was in the past. The information channel relates to the revealing to the market of private information concerning firms' creditworthiness in the form of the price or premium to be paid on the CDS. The reduced incentive to monitor refers to the possibility that some firms may monitor exposures less if they have CDS hedges in place than if they had not. The first two tend to lower the cost of financing, whereas the third channel tends to increase it. The overall direction of the net effect is therefore an empirical question.

Empirical work (based primarily on non-turmoil samples and mainly concerning US corporations) shows that there are signs that CDS spreads lead bond spreads.⁴² In particular, CDS spreads tend to lead changes in bond spreads in the short run, effectively determining the marginal price of credit. The paper in question notes the difficulty of obtaining liquid daily bond prices.

In terms of financing costs, one influential study for the United States, which uses matched samples of firms, has failed to find evidence of CDSs reducing financing costs for the average firm.⁴³ However, the authors did find evidence of increased financing costs for riskier

40 See Prato, O. (2006), "Better capturing risks in the trading book", Financial Stability Review, Banque de France.

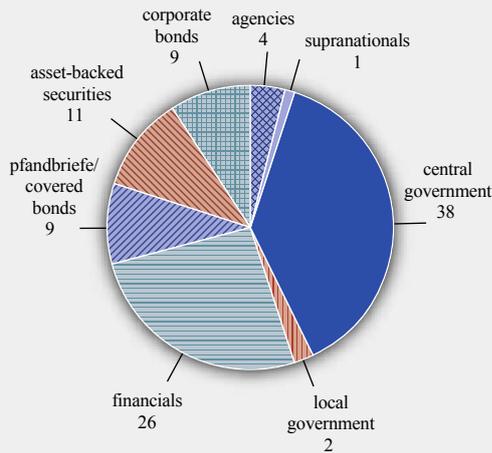
41 A. B. Ashcraft and J. A. C. Santos, "Has the CDS Market Lowered the Cost of Corporate Debt?", Federal Reserve Bank of New York Staff Report No 290, July 2007.

42 Blanco, R., Brennan, S. and Marsh, I. (2005), "An empirical analysis of the dynamic relationship between investment grade bonds and credit default swaps", Journal of Finance, No 60.

43 A. B. Ashcraft and J. A. C. Santos, July 2007, op. cit.

Chart 6.5 Relative size of the euro area corporate bond market

(average issuance between March 2006 and March 2009)



Sources: European Commission bond market note (March 2009) and BSC calculations.

and informationally opaque firms following the beginning of CDS trading for these firms.

Thus, the overall effect that CDSs have on corporate financing costs in Europe cannot be assessed until a similar study is carried out over the pre/post-crisis period. Such a study would need to control for the effect of all other market-wide and firm-specific factors that determine credit spreads. A more practical issue concerning this type of study is the fact that the European bond market is much smaller and tends to be dominated by one or two sectors in terms of issuance (see Chart 6.5). The market may also have relatively limited liquidity at issuance and little to none a few months after issuance.⁴⁴

CDS AND LOAN MARKETS

Several market participants also indicated that CDSs have an impact on access to credit and the cost of funding. Some institutions indicated that they provided pricing guidelines for new loans so that loan terms reflected the market's view of the credit risk of the debtor as part of an active portfolio management process. While the credit crisis may, to some extent, have disrupted these signals, this points to CDSs having a broader

role in the determination of the price of credit. Moreover, some large European firms with strong credit ratings have linked the pricing of credit lines to CDSs.⁴⁵ It can also be noted that in the US, a recently emerging practice has been to replacing ratings triggers by CDS based triggers for loans covenants. CDS spreads have also been included in the calculation of additional margins for collateral margin calls, in some cases, replacing here again ratings triggers.

CDSs have an important role to play in the pricing of government guarantees following the actions of EU Member States during the crisis. A deeper understanding of the factors driving individual institutions' CDS spreads would therefore be useful.

In practical terms, feedback from market participants indicates that they monitor the new issue premium over the corresponding CDS curve. As CDSs are more liquid than bonds, they give an indication of how the credit risk of a reference entity is priced on the secondary market. CDSs are also a source of liquidity for the syndicating banks themselves, helping them to undertake their market-making activities for various types of credit.⁴⁶

⁴⁴ Investors in the cash bond market tend to be "buy and hold" investors, and the issuance size for corporate bonds means that liquidity is limited in secondary trading. Corporate bond markets are, by nature, primary markets. In Europe, around 200,000 corporate bonds are listed. Market sources indicate that only around 100 are traded more than once a day, and only around 50 are traded more than twice a day. This limited primary and secondary market liquidity makes it more difficult for market participants to take an alternative view. For example, the limited liquidity makes it more difficult to short credit issues directly via the repo market. The task of finding a bond issuance of a significant size to borrow in exchange for the repo rate fee and then sell on for cash to another investor is difficult. It also exposes the short investor to basis risk if the repo rate changes. As most repos tend to be short-term (overnight to several weeks), this further limits the ability to short cash bonds over extended periods.

⁴⁵ See "RLPC-Nestle in market with CDS-linked backstop facility", Reuters, 23 October 2008, "Banks seek market-based pricing scheme", Financial Times, 1 July 2008 and "Citigroup, Credit Suisse link loans to swaps in shift", Bloomberg, 29 October 2008.

⁴⁶ This may support the recent CESR consultation paper on the transparency of corporate bond, structured finance and credit derivative markets published on 19 December 2008. CESR underlined the strong interaction between the cash bond and derivative markets, with the latter being used as a pricing tool in the former.

While activity in the CDS market is often effectively used both as a means of determining prices in the underlying cash bond market and as a means of reference pricing, recent events in the CDS market suggest that this interrelationship may not be functioning as well in these difficult market conditions.

This is because pricing in the cash market reflects credit risk and funding risk, whereas pricing in the CDS market focuses on credit risk and counterparty risk. Indeed, part of the break between the CDS market and the cash bond market in the current financial crisis has resulted from the role that counterparty risk plays in the pricing of CDSs and the role that funding risk plays in the pricing of cash bonds. When markets return to more normal conditions, a relationship between the two markets that is closer to the historical norm may re-emerge. This relationship needs to be monitored carefully in the future – especially in Europe, where the underlying cash bond market is considerably smaller than that of the United States. For example, when robust investment-grade issuance began to be observed in early 2009, market participants were willing to trade only in basic packages.

As the markets came under increasing strain on account of the financial turmoil, liquidity in the CDS markets also began to dry up, raising doubts as to their value as an indicator of risk and funding costs.

In this context, it could be argued that the cost of hedging for corporate bonds was artificially high because the lack of liquidity had exacerbated trades conducted by some investors (such as hedge funds) as a result of credit arbitrage strategies. The widening of spreads may have posed problems with regard to corporate issuers' ability to raise money or roll over debt in capital markets, as investors required the yields of corporate cash bonds to be aligned with the CDS market for investment purposes. The magnitude of these co-movements may increase when credit quality deteriorates.

The Committee of European Securities Regulators (CESR) has recently indicated that

although the CDS market has, in normal market conditions, proved useful as a source of price information, it is not a reliable indicator for the pricing of bonds in times of reduced liquidity (such as the current market conditions).⁴⁷ It has also been outlined within the Turner review, that CDS prices may systematically understate credit risk during economic upswings and overstate credit risk during economic downturns. The practice of using CDS prices to assess illiquid underlying bonds may then be potentially procyclical, making overall CDS spreads poor indicators of risk.⁴⁸

CREDIT RATINGS AND MARKET-IMPLIED RATINGS

Recently, credit rating agencies have used the price discovery function of CDSs by creating market-implied ratings. These are ratings implied by the probability of default derived from CDS spreads for various benchmark (median) rating baskets. If the observed spread differs significantly from the relevant benchmark rating basket, the spread is matched to a lower rating basket, creating a gap between the market-implied rating and the relevant benchmark credit rating. For instance, Moody's has indicated in its communication with clients that a seven-notch gap between an entity's credit rating and the corresponding CDS-based market-implied rating results in the probability of the credit rating being downgraded increasing by 40% over a one year horizon.

In an extreme situation, this could create a self-reinforcing cycle, potentially fostering actual downgrades based on market-implied downgrades. The increase in funding costs could then weigh on the financial structure of the firm and make refinancing even more difficult.

Credit rating agencies' "through the cycle approach" should, in theory, prevent them from being overly responsive to market developments. Credit rating agencies have confirmed that CDSs are used for monitoring purposes, together with

⁴⁷ "Transparency of corporate bond, structured finance product and credit derivatives markets", CESR/09-349, 30 June 2009.

⁴⁸ See "The Turner Review, a regulatory response to the global banking crisis", Financial Services Authority, UK, March 2009.

market-implied indicators such as equity prices and bond spreads. However, they reported that it was very difficult to determine whether CDS spreads were driven by market liquidity or credit fundamentals.

For Standard & Poor's, CDSs serve as "early warning" signals to detect potential outliers that may warrant urgent review. However, Standard & Poor's does not have a threshold for CDS premia that would automatically trigger a review. This diversity in terms of behaviour reduces the risk of a negative feedback loop between CDSs, ratings and the cost of funding.

Fitch regularly monitors discrepancies between its standard ratings and market-implied indicators. Moody's uses CDSs in the same way, and Moody's analysts are usually required to comment on and explain any significant discrepancies between standard credit ratings and market-implied credit ratings to a credit committee. In addition, Moody's has highlighted the fact that CDS spreads can have both a direct and an indirect effect on the earnings, capital and liquidity of financial institutions such as investment banks and securities firms. The confidence of counterparties and customers, which can be affected by changes in firms' spreads, is extremely important to these firms' ability to fund themselves and maintain their attractiveness as a trading counterparty. Thus, CDS spreads may, in many cases, determine the size of counterparty valuation adjustments and can have an impact on counterparty risk limits.

For instance, some studies have indicated that, as regards the predictive power of financial indicators, the CDS market is particularly useful for negative events and stock prices are

particularly useful for positive events.⁴⁹ At this stage, although credit rating agencies are likely, since the beginning of the financial turmoil, to have been placing greater emphasis on CDS analysis for reviews of current credit ratings, it is unclear whether greater emphasis has also been placed on CDSs in analysing credit risk and allocating credit ratings. Analysis of the volatility of ratings in the period ahead could provide further insight on this point. In particular, consideration could be given to the question of whether CDSs play a role in the migration of ratings or transition risk, as well as whether there are feedback effects from market-implied ratings.

6.3 CDS PRICE TRANSPARENCY

Asymmetrical information regarding CDS prices is a challenge for non-dealer market participants.

Price information is currently limited, as dealer prices are typically set on a bilateral basis and are not available to non-dealers. Some consensus prices are released by commercial data providers on an intraday or end-of-day basis, but these prices do not provide information on counterparties or trade volumes. In addition, regulators' access to those prices is not sufficient. Increased transparency as regards turnover volumes for trades – for instance, aggregated daily turnover volumes – is desirable for both non-dealer market participants and regulators.

49 Cesare, A. (2006), "Do Market-based Indicators Anticipate Rating Agencies? Evidence for International Banks", Economic Research Paper No 593, Banca d'Italia.

Box 11

CORPORATE CDS MARKET QUOTES – RESEARCH BASED ON COMMERCIAL DATA PROVIDERS

There are basically two types of price information currently available to participants in European credit derivatives markets: 1) dealer quotes and 2) dealer average/consensus prices that are reported by commercial data providers. Banks are a significant source of price information and provide pre-trade pricing indications on a bilateral basis in response to requests for quotes from clients. These quotes are typically not disseminated, although some market data vendors do disseminate average dealer quotes on an intraday basis.

Indeed, dealer average/consensus prices for a very large proportion of European CDSs are available on both an intraday basis and at the end of the day from data vendors, such as Markit, and, in a generic form, from Thompson Financial Datastream and Bloomberg. Spreads are typically calculated as mid-points from a range of quotes submitted to the data provider. Moreover, the quotes submitted to the data provider may not be indicative of actual trading prices or volumes. As the CDS market is an OTC market, or “dealer to dealer” market, information on the name of the quote provider, trading volumes, quotes/trades per day, and trade size are provided, but other potential indicators of liquidity for individual CDS contracts are not made available to non-dealers.

As part of their data cleaning process, Markit remove “stale” quotes, and outliers, and only include spreads based on at least three quotes. These average/consensus prices are derived from contributors’ books of record and are relied upon by both sell-side and buy-side participants for price discovery and portfolio valuation. However, contributors may not necessarily have traded a particular CDS during the day. When a contributor buys or sells protection in respect of a particular reference entity during the day, it is expected to provide the price at which it traded, although it is under no obligation to do so. Even when a contributor provides the traded price, it is typically not identified as such by the market data vendor, which uses it as just as another data point to be included in the average/consensus price.

As a result, users of average/consensus prices do not know whether the consensus price for a particular CDS incorporates any traded prices or, if so, what the traded prices were. The CESR has stressed the importance of post-trading information, such as prices and volumes, as it can play a role in the European CDS market by supporting price formation, reinforcing valuation practices and providing supplementary information about the scale of credit risk transfers. Some market participants have argued that price information, where available, is not provided on a non-discriminatory, competitive basis. Dealers are viewed as possessing significantly more raw data than investors because they engage in more transactions than their customers. This information asymmetry impairs customers’ ability to evaluate the prices they are offered by dealers and to negotiate effectively to obtain narrower spreads and better prices. At times of high risk or market volatility, investors’ awareness that they are at a disadvantage may make them less willing to trade, which may impair liquidity.

6.4 CDSS, SYSTEMIC RISK INDICATORS, AND CROSS-MARKET LINKAGES

CDSs have frequently been used as a leading indicator during the financial crisis, with CDS spreads being used as aggregate indicators of credit risk. In theory, CDS spreads should provide a pure measure of default risk, since they are an instrument for the exchange of cash flows between the buyer and seller of credit protection, and these flows represent the price of protection against the default of the underlying entity. When combined with a default correlation structure, they can be used to gauge pressures on the European and global financial systems (see Chart 6.6).

More specifically, CDS spreads reflect expectations of credit protection sellers and buyers about the difference between the present value of fixed-rate premium payments to be made by protection buyers and the present value of the settlement to be made by protection sellers should a credit event materialise.⁵⁰ Thus, CDS spreads should be predominantly determined by market participants' assumptions about the probability of default of the underlying entity. In

the most basic approach to the valuation of CDS spreads, they are a function of the probability of default (PD) and the recovery rate (RR):

$$\text{CDS spread} = \text{PD} \times (1 - \text{RR})$$

Although this is a simple approximation, a few important conclusions may be drawn. First, it is clear that assumptions about the recovery rate are important in determining the level of the CDS spread. Consequently, the use of constant recovery rates in pricing models may not be appropriate in all circumstances. Second, in many pricing models recovery rates are assumed to be fixed, but some authors suggest that the probability of default and loss given default (which is equal to 1-RR) may be cyclically interdependent, i.e. there is a negative correlation between the default rate and the recovery rate over the cycle.⁵¹ This would imply a positive correlation between loss given default and the probability of default. Thus, during economic

⁵⁰ See also the report entitled "Credit Default Swaps: Market, Systemic, and Individual Firm Risks in Perspective", Special Comment, Moody's, May 2008.

⁵¹ Altman, E. I., "Credit risk and the link between default and recovery rates", CFA Institute publication, No 1, December 2006.

Chart 6.6 The ECB's systemic risk indicator

(January 2007 – July 2009)



Sources: Bloomberg and ECB calculations.

Note: The systemic risk indicator, i.e. the probability of two or more large and complex banking groups (LCBGs) defaulting simultaneously, was introduced in Box 16 of the December 2007 Financial Stability Review.

downturns CDS spreads may increase disproportionately more than the probability of default owing to the fact that increasing losses given default multiply the initial increase.

In fact, recovery rates have been significantly lower so far in the current cycle than they were on average in the past, implying that assumed losses given default have increased during the recent period of market stress (see Table 6.3).

Two methods for calculating the recovery rates have been proposed in the literature. First, the recovery rate is assumed to take the form of a stochastic process. Market sources indicate that this method may be less effective when pricing or hedging tranche products. Second, techniques that take account of bond market

developments – such as the cheapest-to-deliver bond price – are used to estimate the most accurate recovery rate.⁵² However, this method may be less accurate in the context of impaired liquidity during a period of distress.

Recovery rates may not be the only factor that contributes to this multiplication effect in the pricing of CDS spreads. In fact, in the period of financial market stress, as well as a higher liquidity risk premium and falling recovery rates, CDS spreads may also have been affected by other risk premia, such as for jump-to-default risk and systemic risk, which in normal times have a negligible impact on the level of CDS spreads.

⁵² See Singh, M. and Spackman, C., “The use (and abuse) of CDS spreads during distress”, IMF Working Paper No 09/62, March 2009.

Table 6.3 Recovery rates

Date	B, L	Entity	Country	Sector	Event	Recovery rates	
						Senior debt	Subordinated debt
17 May 2005	B	Collins & Aikman Products	US	Auto parts		43.625	6.375
14 Sep. 2005	B	Delta	US	Airline		18.000	
14 Sep. 2005	B	Northwest	US	Airline		28.000	
08 Oct. 2005	B	Delphi	US	Auto parts		63.375	
20 Dec. 2005	B	Calpine	US	Utility		19.125	
03 Mar. 2006	B	Dana	US	Auto parts		75.000	
30 Oct. 2006	B	Dura	US	Auto parts		24.125	3.500
15 Sep. 2007	L	Movie Gallery	US	Entertainment		91.500	
21 Jan. 2008	B	Quebecor	CA	Printing	Chapter 11/CCAA	41.250	
04 Sep. 2008	B	Tembec	US	Forest Products	Chapter 15	83.000	
07 Sep. 2008	B	Fannie Mae	US	Financial	Conservatorship	91.510	99.900
07 Sep. 2008	B	Freddie Mac	US	Financial	Conservatorship	94.000	98.000
15 Sep. 2008	B	Lehman Brothers Holding	US	Financial	Chapter 11	8.625	
26 Sep. 2008	B	Washington Mutual Inc.	US	Bank	Chapter 11	57.000	
07 Oct. 2008	B	Landesbanki	IS	Bank	Receivership	1.250	0.125
07 Oct. 2008	B	Gleitnir	IS	Bank	Receivership	3.000	0.125
08 Oct. 2008	B	Kaupthing	IS	Bank	Receivership	6.625	2.375
14 Nov. 2008	L	Masonite	CA	Construction	Failure to pay	52.500	
01 Dec. 2008	L	Hawaiian Telcom Comm.	US	Telecommunications	Chapter 11	40.125	
09 Dec. 2008	L	Tribune	US	Media	Chapter 11	23.750	
09 Dec. 2008	B	Tribune	US	Media	Chapter 11	1.500	
15 Nov. 2008	B	Ecuador	EC	Sovereign	Failure to pay	31.375	
14 Jan. 2009	L	Sanitec	GB	Bathroom fittings	Failure to pay	33.500	
14 Jan. 2009	B	Nortel Corp.	CA	Telecommunications	Chapter 11/CCAA	6.500	
15 Jan. 2009	L	Lyondell Chemical	US	Chemicals	Chapter 11	20.750	
15 Jan. 2009	B	Lyondell Chemical	US	Chemicals	Chapter 11	15.500	
26 Jan. 2009	B	Smurfit-Stone	US	Packaging	Chapter 11	8.875	
26 Jan. 2009	L	Consolidated Enterpised Smurfit-Stone Consolidated Enterpised	US	Packaging	Chapter 11	63.750	

Sources: Commerzbank Research, Creditex and ISDA.
Notes: B=bond CDSs, L=loan only auctions, CCAA = Companies' Creditors Arrangement Act.

For instance, if recent history is any guide, Lehman Brothers' default was a classic example of the materialisation of jump-to-default risk, i.e. the risk of a credit default occurring suddenly before the market is able to smoothly incorporate the increased default risk into current spreads. In fact, Lehman Brothers defaulted over a weekend (see Chart 6.7). Systemic risk, i.e. the risk of the simultaneous failure of a number of institutions or of the entire financial system due to interlinkages within the system, may be particularly significant for the pricing of CDS spreads of banks or insurance companies, which have relatively more interlinkages than entities in the non-financial sectors.

The above-mentioned risk premia seem to have played an important role in determining the CDS spreads of banks. Box 12 at the end of the chapter takes a closer look at the extent to which these factors have had an impact on banks' CDS spreads during the current crisis. It finds that, first, the significant widening of euro area banks' CDS spreads observed since August 2007 has been driven mainly by the default risk premium, which is determined by other factors in addition to the pure default risk of individual institutions. Second, the expected loss component increased only moderately at the beginning of the crisis and picked up significantly towards the end of 2008. Further analysis reveals that the default risk premium was mainly driven by systemic risk and liquidity risk.

Chart 6.7 Materialisation of jump-to-default risk during Lehman Brothers' default

(CDS spread; basis points; senior debt; five-year maturity)



Source: Bloomberg.

As well as debt markets, CDSs are also linked to equity markets. Hedging corporate credit risk traditionally involves a type of capital structure trade, in which equities are bought or sold depending on the nature of the hedge required.⁵³ Financial theory posits a structural relationship between debt and equity implied by a Merton model. Large sophisticated investors, such as investment banks and hedge funds, use signals from both markets as inputs for much more sophisticated models in their trading on both equity and credit markets if they perceive that one market offers more value relative to the other or that investors in one market are mispricing perceived risks.⁵⁴

Recently, the growth of CDS markets has facilitated the growth of this type of trading, as it is no longer necessary to buy the underlying cash bonds (which may involve sizeable transaction costs) but credit protection can instead be bought or sold in the CDS market.⁵⁵ Empirical research on individual US firms finds that CDS spreads can be explained better by models that include equity volatility and jump risk measures to account for the sudden widening of CDS spreads.

Some academic researchers have even proposed that CDS spreads should be more actively used by public authorities for regulatory monitoring and interventions.⁵⁶ In particular, it is proposed that they be used as a trigger mechanism and banks should be required to take corrective

53 See Yu, F., "How profitable is capital structure arbitrage?", *Financial Analysts Journal*, 62(5), 2006.

54 Using equity prices and other inputs, some approaches use a modified a Merton model to generate a model-implied CDS spread. Traditionally, debt-equity trading strategies – so-called capital structure arbitrage – have been widely used to take advantage of structural features and pricing differences between debt and equity markets. See Zhang, B., Zhou, H., and Zhu, H., "Explaining Credit Default Swap Spreads with Equity Volatility and Jump Risks of Individual Firms", Federal Reserve Board of Governors, Finance and Economics Discussion Series, 2005-63.

55 For example, if investors take the view that a firm's profitability will decline, a simple trading strategy would be to buy CDS protection (short credit risk) as they expect the CDS spread to widen. At the same time, they could sell put options on the equity as they expect the equity price to decline. See Das, S. and Hanouna, P., "Hedging credit: equity liquidity matters", mimeo, Santa Clara University, 2007; and Fulop, A. and Lescouret, L., "How liquid is the CDS market?", ESSEC/CREST, mimeo, 2007.

56 See Hart, O. and Zingales, L., "A new capital regulation for large financial institutions", CEPR Discussion Paper No 7298, May 2009.

action to increase their capital buffers, among other measures, if CDS spreads for their institutions exceed a certain threshold. Extensive regulatory use of CDS spreads to contain systemic risk would only be possible if the CDS market applied a fair value to risk during periods characterised by high levels of volatility and/or constrained liquidity. It is also not clear how such a mechanism would handle jump-to-default risks. Overall, the linkage between equity and credit markets may have become more of a two-way phenomenon.⁵⁷ This could lead to negative pro-cyclical effects should this relationship turn into a feedback loop. CDSs could thus influence not just bond markets, but also equity markets. At the same time, the equity markets may influence developments on the CDS market or the bond market. While this has been noted by the Joint Forum in its work on credit risk transfer, the potential for two-way spillovers across markets in the EU has not yet been fully and systematically investigated.

Given the markedly lower recovery rates observed following Lehman Brothers' bankruptcy by comparison with historical levels, further studies looking at the mechanisms of the auction process may be warranted in order to better understand the price discovery mechanism within the CDS market and the related role of recovery rates as part of an overall assessment of the efficiency of the CDS market. A Federal Reserve review of 43 ISDA auctions conducted between 2005 and 2009 indicated that the auctions appeared, by and large, to have been efficient, with the auction prices close to the prices observed in the bond market before and after the auction in question. However, anomalies do occasionally occur, as in the case of Fannie Mae. In this particular case, there was strong demand during the auction process for Fannie Mae's subordinated debt, resulting in the recovery rate for subordinated debt exceeding that observed for that entity's senior debt.⁵⁸ A natural extension of this report may be to analyse in detail the recovery rates seen for European reference entities.

6.5 SOVEREIGN CDS DEVELOPMENTS

A clear case of spillover across markets was the transfer of contingent or actual credit risk from the financial sector to the governments of several EU Member States following the rollout of national rescue packages in the last quarter of 2008. The widening of CDS spreads observed in mid-March 2009 may have been related to increasing concerns among market participants that feared that the only possible solution to the problems faced by banks was their temporary nationalisation. This led to a convergence of sovereign and financial CDS spreads (see Chart 6.8).

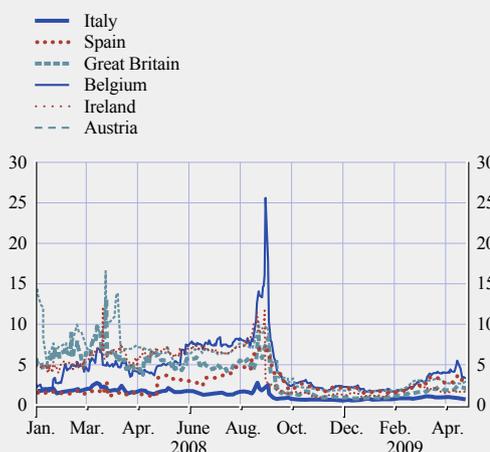
The sharp increase in sovereign CDSs has been a cause for debate among market observers.

It is questionable whether the magnitude of the increase objectively reflects the increased risk-neutral probabilities of default that, using certain assumptions about the recovery rate, can be backed out of the CDS spread. When they are

- 57 "CDS: Has past polluted the prologue?", CreditSights, March 2009.
58 J. Helwege, S. Maurer, A. Sarkar and Y. Wang, "Credit Default Swap Auctions", Federal Reserve Bank of New York Staff Report No 372. (2009)

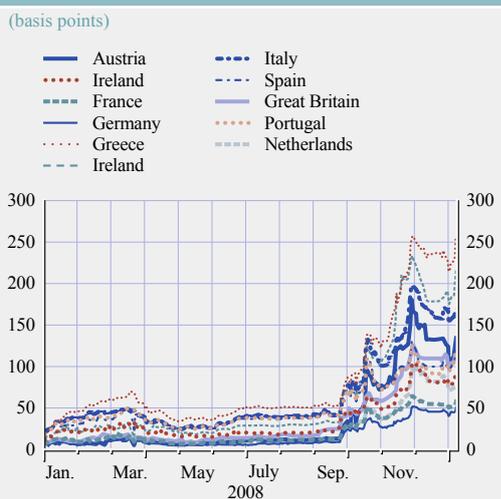
Chart 6.8 Convergence of selected EU financial and sovereign CDS spreads

(ratio; January 2008 – July 2009)



Sources: Thompson Financial Datastream data and calculations.
Note: The ratio comprises the median spread between the largest banks' five-year senior CDSs and their five-year sovereign CDSs.

Chart 6.9 CDS premia on EU sovereign debt



Source: Thompson Financial Datastream.

compared with actual or physical sovereign default probabilities, there appears to be a divergence.

Since CDS-implied probabilities are risk neutral, they are much higher in practice than physical or real world advanced economy default probabilities as reflected in credit ratings. However, wider CDS spreads may also reflect expectations of slower economic growth and the need to finance large budget deficits in an economic downturn. Therefore, sovereign CDSs may also capture the migration risk of moving to a lower credit rating. Academic research in this area on emerging market economies suggests that the credit event risk premium on sovereign CDSs is closely related to financial market volatility and credit and financing conditions.⁵⁹

Sovereign CDS spreads have a different interpretation to corporate CDS spreads for two main reasons. Advanced economy credit events (such as failure to pay) are extremely rare, which makes it difficult for investors to estimate how much of their investment they would recover in the event of bankruptcy – a key determinant in CDS pricing.⁶⁰ Moreover, payouts on the swaps are triggered in different ways. In contrast to

corporate CDSs, bankruptcy is not a credit event for sovereign CDSs, as there is no sovereign bankruptcy court to adjudicate on sovereign bankruptcy proceedings. Moreover, a corporation generally has a grace period for its debt payments before a credit event is declared and protection is paid off. Governments have no such grace period. Sovereign CDSs tend to be priced in currencies other than the national currency. For example, euro area reference entities tend to be priced in US dollars, as large devaluations in the national currency could be expected were a credit event to occur.

It is argued by some commentators that liquidity in sovereign CDSs for EU Member States was very limited prior to the outbreak of the crisis and CDS spreads for some EU Member States were close to zero in the generally benign credit environment.

According to figures from the DTCC, the number of contracts and the notional value of derivatives on some 60 sovereign borrowers have generally held steady or grown slightly faster than the overall CDS market between October 2008 and June 2009. The DTCC puts the notional value of CDS contracts on US debt at USD 9 billion – barely 0.1% of the total amount of publicly held US debt. The value of sovereign CDSs is just 6% of all CDSs, according to the BIS. However, relative changes in gross notional values and rankings can be observed over the period (see Table 6.4).

Activity in the sovereign CDS market could be the result of several types of trading strategies. First, relative value strategies take long and short positions simultaneously to exploit perceived mispricing. For example, sharp increases in sovereign CDS spreads may feed through to non-financial corporations' funding costs, as premia for sovereign CDSs may

⁵⁹ See Pan, J. and Singleton, K., "Default and recovery implicit in the term structure of sovereign CDS spreads", *Journal of Finance*, October 2008.

⁶⁰ Typical sovereign CDS credit events are (i) obligation acceleration, (ii) failure to pay, (iii) restructuring, and (iv) repudiation/moratorium.

generally constitute a floor for issuers. The sharp increase in sovereign CDS spreads above those for corporations located in the same country in October 2008 also encouraged large investors, such as hedge funds and some banks, to (i) sell CDS protection on sovereign reference entities and (ii) buy CDS protection on corporations located in the same country. At the same time, hedge funds may also be net buyers of sovereign CDSs. As a result, developments in sovereign CDS spreads may not be a reflection solely of market participants' expectations regarding the probability of default, also reflecting short-term expectations regarding prices in the light of increases in sovereign bond issuance.⁶¹

Second, portfolio investment strategies can be used, such as acquiring CDS protection for the purposes of macro-hedging bond portfolios. This strategy is employed by structural investors such as insurance companies and can be achieved by buying sovereign CDSs. Synthetic structured products such as first-to-default basket CDSs on sovereign risk have also been used by investors.

Despite the growth in liquidity, there are some discrepancies between sovereign CDS market-implied credit ratings and actual default ratings, as in the corporate market. For example,

the market-implied credit ratings derived from sovereign CDS spreads have diverged from standard credit ratings since the outbreak of the crisis, potentially indicating an increased probability of a credit rating downgrade.

The potential policy implications of the influence that CDS spreads may have on the credit ratings of sovereign governments in illiquid market conditions, and the negative feedback effects that could ensue, warrant further research for the purposes of financial stability monitoring, as does the current opacity with regard to market participants and turnover volumes. The U.S Government Accountability Office has in a recent report also reported that the lack of transparency in CDS markets and the potential for manipulation related to the use of CDS as a price discovery mechanism are some of the risks and challenges of the CDS market.⁶²

61 "Role reversal? Sovereign and corporate risk", Merrill Lynch, 24 February 2009, p. 3.

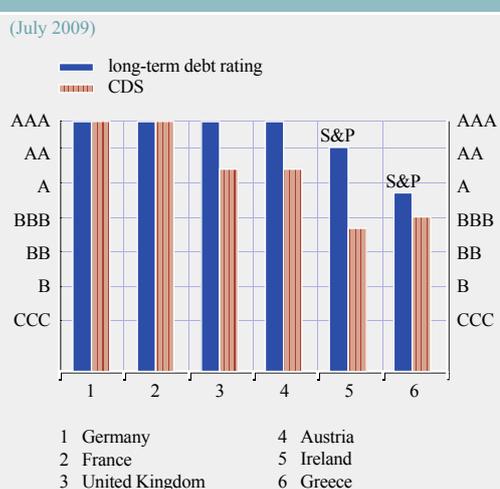
62 See "Systematic Risk, Regulatory Oversight and Recent Initiatives to Address Risk Posed by Credit Default Swaps", Testimony before the Subcommittee on Capital Markets, Insurance and Government Sponsored Enterprises, O. Williams, United States Government Accountability Office, March 2009.

Table 6.4 Top ten sovereign reference entities

Country	31 October 2008		31 July 2009	
	Gross notional amount	Rank	Gross notional amount	Rank
Italy	149	3	190	1
Spain	61	23	79	9
Germany	38	58	5	28
Greece	34	72	48	34
Portugal	24	172	44	42
France	21	221	41	49
Austria	15	344	32	158
Ireland	17	305	25	84
United Kingdom	12	442	23	191
Belgium	12	437	22	192

Source: DTCC.

Chart 6.10 Standard credit ratings and market-implied credit ratings



Markit announced at the end of June 2009 that it would launch a family of indices in July to track various sovereign indices, such as the G7 and the SovX Western Europe indices. The latter index, comprising 15 European sovereign names, is scheduled to be launched in September 2009. These indices will allow market participants to take a view on sovereign credit risk and may increase overall liquidity and transparency, in particular if these instruments become eligible for clearing through CCPs.

6.6 CONCLUSIONS

Given the importance of bank intermediation in the euro area and Europe in general, further analytical work needs to be undertaken in a number of areas in order to support policy-makers' discussions on the potential benefits and costs of CDSs and their impact on financial stability. These areas include the following.

First, there is a lack of empirical research on how CDSs are used by euro area banks. The experience of individual Member States and the findings of this report show that it is both possible and useful to collect this information (e.g. via quantitative surveys if no other sources of information exist) in order to monitor the impact of CDSs and their related derivatives on financial stability. In addition, further work on developing methodological frameworks for analysis is required.

This is important to ensure that banks are not substituting one type of risk – credit risk – for another – counterparty risk.

Second, further work is needed to quantify the role of CDSs in setting the marginal price of corporate credit in Europe and in the euro area. The lack of consistent publicly available data is one of the factors limiting the work in this area. Furthermore, analysis of the volatility of credit ratings in the near future could give further insights regarding feedback from credit ratings and the CDS market. In particular, studies could assess whether CDSs have roles to play in rating migration risk or transition risk, as well as whether there are feedback effects from market-implied ratings.

Third, the signalling properties of the CDS market in respect of individual firms and their use in systemic assessment should continue to be reviewed as the current market turmoil unfolds. It would also be useful to conduct studies for a better understanding of cross-market linkages before and during the crisis.

Fourth, further studies of the mechanisms of the auction process may be warranted in order to better understand the price discovery mechanism within the CDS market and the related role of recovery rates as part of an overall assessment of the efficiency of the CDS market and, in particular, the drivers of the recovery rates seen for European reference entities.

Finally, the impact of sovereign CDS market developments on government bond markets and any feedback to rating transition risk may warrant further research for the purposes of financial stability monitoring.

Box 12

DECOMPOSING BANKS' CDS SPREADS

According to intensity-based CDS pricing models, the CDS premium (CDS) can be decomposed into an expected loss component (EL) and a default risk premium (DR). The latter is composed of a jump-to-default risk premium (JtD), which is compensation for the sudden default of the entity before the market has had time to factor its increased default risk into current spreads, and a systemic risk premium (S), which is compensation for the volatility of risk factors affecting default probability:

$$CDS = EL + DR = EL + JtD + S \quad (1)$$

The default risk premium can be measured as the difference between the CDS spread and the expected loss component. The decomposition can also be written as follows:

$$CDS = EL * RA \quad (2)$$

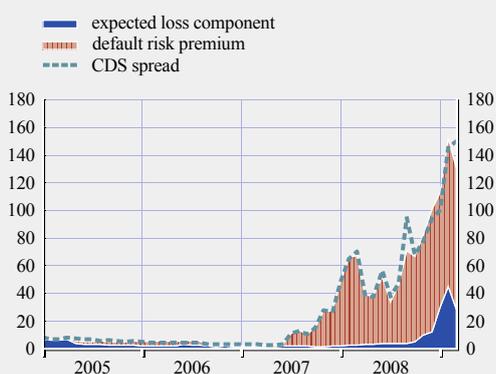
where the risk adjustment ratio (RA) is compensation for a unit of expected loss and usually reflects the price of default risk (PDR):

$$RA = 1 + PDR \quad (3)$$

Using equation (2), both the price of default risk and the risk adjustment ratio may be approximated by the ratio of CDS to EL. This ratio is a measure of investors' aversion to default risk. The significant widening of CDS spreads of euro area large and complex banking groups observed since August 2007 has mainly been driven by the default risk premium (see Chart A). Whereas the largest proportion of CDS spreads corresponded to the compensation for expected loss between 2005 and mid-2007, since the eruption of the turmoil the expected loss component has increased only moderately in comparison with the default risk premium. However, the expected loss component has increased substantially since the end of 2008, accounting for a larger proportion of the high CDS spreads. Since April 2008 aversion to credit

Chart A Decomposition of CDS spreads of euro area banks

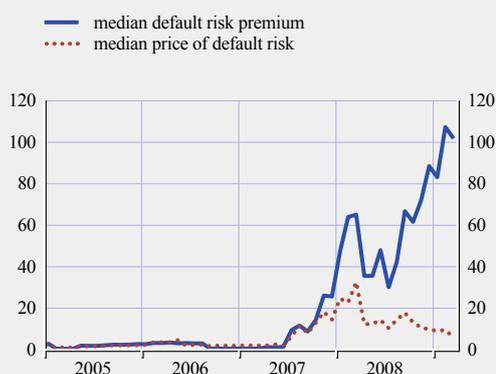
(January 2005 – April 2009)



Sources: Bloomberg and ECB calculations.

Chart B Default risk premium and the price of default risk indicator

(January 2005 – April 2009)



Sources: Bloomberg and ECB calculations.

risk, as measured by the price of default risk, has steadily declined (see Chart B). Although it still remains relatively high compared with the level before the eruption of the turmoil, it has decreased substantially below the record high levels seen after the default of Bear Stearns. This is due to the increase in the expected loss component, which has risen steadily since the end of 2008, suggesting that CDS spreads are increasingly being driven by rising probabilities of default of individual banks. A simple value-at-risk model-based decomposition of the variance of the risk premium reveals that as much as 46% of the variance may be explained by systemic risk as measured by the systemic risk indicator, and another 25% by liquidity as measured by the market liquidity risk indicator. This suggests that investors' strong aversion to the credit risk of large and complex banking groups is mainly driven by fears related to jump-to-default risk due to the possibility of a systemic spillover and, to a lesser extent, by vanishing liquidity in the broader financial markets.

Box 13

CDSs AND THE EMPTY CREDITOR PROBLEM

Historically, banks and other creditors have had incentives to restructure troubled debt and avoid tipping solvent companies into bankruptcy by withdrawing funding or not conducting debt workouts. However, creditors with CDS protection may have less incentive to undertake such restructuring and may find it more expedient to push troubled companies into bankruptcy. Indeed, whereas other bond holders are reluctant to proceed to a bankruptcy filing that can take years to get the bonds settled, CDS holders can immediately cash in on their CDS positions, as CDSs are typically settled within a month. Thus, creditors that have bought CDS protection and retain little economic exposure to the firm because they simultaneously hold bonds and matched maturity CDSs – “empty creditors” or basis holders – do not have the same incentives as other bank lenders or bond holders to try to avoid bankruptcy.

However, while they may benefit from a CDS trigger, they do not necessarily wish to see the firm file for bankruptcy.

First, if they hold a CDS on a bond for hedging purposes, they may prefer to just be able to remove that protection once the firm has recovered following a restructuring of the debt. For example, a refinancing reached by the firm Louisiana Pacific was driven mainly by CDS holders that had a negative basis and a secured/unsecured positive recovery differential. The firm was able to successfully issue USD 375 million of senior secured notes due in 2017 and avoid running out of liquidity when its senior unsecured notes fall due in 2010.

Second, if such creditors intended to play the basis in a purely speculative strategy, they can still have a positive carry without the company going bankrupt and, should the CDS be triggered, they are indifferent to the type of trigger. The CDSs of Station Casinos, for example, were triggered by a failure to pay a coupon on bonds. Lenders entered into a 45-day forbearance agreement, choosing not to accelerate bankruptcy and preferring an out-of-court restructuring process.

Third, the incentives of hedged creditors may not be aligned and depend on their net risk position on the reference entity. Banks generally enter into many different transactions with a client.

Losses on other business lines can far exceed profits on the CDS portfolio alone. The aggregate net position is ultimately the main relevant factor when deciding whether or not it could be worth accelerating bankruptcy. In addition, where creditors and CDS holders are commercial banks, they face reputation risk may be reluctant to take the risk of being suspected of having accelerated a client's default.

Furthermore, bond holders with CDS protection may not represent a large proportion of the debt holders and their ability to accelerate bankruptcy will depend on the percentage of bond holders that are effectively empty creditors. Market participants suggest that in most cases the distribution of debt holders tends to be spread widely, making collective action such as hold-outs difficult in a debt renegotiation situation.

Eventually, holders of basis positions trade on the convergence of these positions when they are maturity matched. If a CDS contract is triggered, they receive 100% of the notional value of their basis package (bond plus CDS). When a company is close to default but not yet at that point, there is a limited benefit to be gained from pushing it into bankruptcy. For example, if the sum of the upfront payment requested in the CDS transaction and the value of the bond is about 95% of the notional value of the basis package, there is only a benefit of 5%. In this case, most market participants may rather unwind their trades as they would ordinarily consume capital without delivering much greater benefits. In the case of Station Casinos, the basis traded at 100% or higher for an extended period of time.

Though the empty creditor issue is not a generalised phenomenon, it should be considered on a name-by-name basis. Indeed, hedge exposures and the actions of empty creditors could strengthen pro-cyclicality and, if widespread, could reinforce the downturn in the credit cycle. This issue must be tackled by regulators, which have so far focused on "naked" CDS holders – i.e. those that do not hold cash positions.

The pro-cyclical effect of this type of strategy on the number of bankruptcies is likely to be less pronounced in Europe than in the United States. Indeed, in April 2009 the restructuring of debt ceased to be a credit event in the United States, whereas it remains a credit event for CDSs in Europe. Investors pursuing the empty creditor strategy described above may force firms into restructuring under European CDS contracts, rather than pushing them into bankruptcy.

Nevertheless, one way to limit potential issues arising as a result of empty creditors would be to require parties to debt renegotiations to disclose their CDS protection before the renegotiations begin. The parties involved could then make better informed decisions regarding the debt renegotiations. Such additional disclosure requirements should, however, be considered in tandem with disclosure requirements for other secured creditors such as holders of collateralised loans or holders of credit insurance, unduly disadvantaging users of CDSs as hedging instruments, which may in turn, have a negative impact on the availability of credit.

Notwithstanding these findings, the cascading impact that credit risk transfer instruments could have on the number and pace of bankruptcies in the downswing of the credit cycle as well as potential related downward pressures on CDS auction recovery ratios, requires the joint analysis of CDSs with other credit risk transfer instruments referencing single or multiple entities.¹

¹ "CDS: Recoveries Under Pressure", Creditsights 14 July 2009.

7 REGULATORY AND MARKET INITIATIVES

As discussed in the previous section, counterparty risk is the most significant risk within the CDS market. However, operational risk; the lack of transparency with respect to positions, pre-trade pricing and post-trading prices and volumes; and the accounting treatment and adequacy of the prudential capital requirements are also cause for concern. This section discusses the initiatives (both regulatory and market-led) that have been launched, the recent changes to the CDS market following policy initiatives aimed at addressing these risks and other policy solutions that could be considered for each of these risks.

US AND EUROPEAN COMMISSION FRAMEWORKS

In May 2009 the US Treasury Department released proposals for a comprehensive regulatory framework for all OTC derivatives (including CDSs) in the United States (see Box 14). Much of the work described is already under way internationally in respect of CDSs.

On 3 July 2009 the European Commission published its Communication Paper, Consultation Document and Staff Working Paper on the broader derivatives market. The Communication summarised the Commission's position on the interim objectives aimed at mitigating the risk that OTC derivatives pose to financial stability. These interim objectives are:

- strengthening counterparty credit risk mitigation; and
- increasing transparency.

The Consultation Document identified the following tools for achieving the objectives described above:⁶³

- promoting further standardisation;
- strengthening the bilateral collateralisation management of non-CCP-eligible contracts;

- enhancing the use of central data repositories;
- moving the clearing of standardised OTC derivatives to CCPs;
- increasing the transparency of prices, transactions and positions; and
- moving (part or all of) trading to public trading venues (i.e. regulated markets and multilateral trading facilities subject to public disclosure requirements).

The Communication Paper outlines the strong reasons for central counterparty clearing to be located in Europe. They relate to regulatory, supervisory and monetary policy concerns. In particular, if a CCP is located in Europe, it is subject to European rules and supervision. The paper also points out that it would be easier for European authorities to intervene in the event of a problem involving a European CCP.⁶⁴

The consultation will remain open until the end of August and will be followed by a public meeting on 25 September 2009.

⁶³ "Consultation document: Possible initiatives to enhance the resilience of OTC derivatives markets", European Commission, SEC (2009) 914, 3 July 2009.

⁶⁴ "Ensuring efficient, safe and sound derivatives markets", European Commission, COM (2009) 332, 3 July 2009.

Box 14

US TREASURY PROPOSALS FOR A REGULATORY FRAMEWORK FOR OTC DERIVATIVES

The US Treasury Department recently set out proposals for a comprehensive regulatory framework for all OTC derivatives (including CDSs). These proposals are summarised below.

Preventing activities within the OTC markets from posing a risk to the financial system

To give regulators the necessary powers to act to protect financial stability, laws should be introduced or amended to require all standardised OTC derivatives to be cleared through regulated CCPs.

All OTC derivatives dealers and all other firms that create large exposures to counterparties should be subject to a robust regime of prudential supervision and regulation.

Promoting efficiency and transparency within the OTC markets

To provide regulators with comprehensive and timely information about the positions of all participants, laws should be introduced or amended to require:

- Recordkeeping and reporting requirements (including audit trails) to be complied with.
- All trades not cleared by CCPs to be reported to a regulated trade repository.
- The movement of standardised trades onto regulated exchanges and regulated transparent electronic trade execution systems.
- The development of a system for the timely reporting of trades and dissemination of prices and other trade information.
- The encouragement of regulated institutions to make greater use of regulated exchange-traded derivatives.

Preventing market manipulation, fraud, and other market abuses

Laws should be introduced or amended to give market regulators clear and unimpeded authority to police fraud, market manipulation and other market abuses, including the authority to set position limits on OTC derivatives that perform or affect a significant price discovery function with respect to futures markets.

Ensuring that OTC derivatives are not marketed inappropriately to unsophisticated parties

This would limit the types of counterparty that can participate in OTC markets and possible spillover effects in the broader financial markets.

7.1 CDS CENTRAL COUNTERPARTY CLEARING

As a consequence of the near-failure of Bear Stearns and the bankruptcy of Lehman Brothers, a great deal of regulatory and political attention has focused on the risks posed by the failure of a major dealer. Therefore, the establishment of CCPs for CDSs as a method of addressing the significant counterparty risk in this market has become a priority.

In March 2008 the President's Working Group on Financial Markets (PWG)⁶⁵ set out recommendations to improve the US and global financial markets, including the development of a CCP for CDSs. The Financial Stability Board⁶⁶ further recommended that the "financial industry should develop a longer-term plan for a reliable operational infrastructure supporting OTC derivatives".

In July 2008, in a letter to supervisors,⁶⁷ the major US dealers committed to supporting and utilising CCP clearing for single-name, index and index tranche products where practicable. They further committed to ensuring that any CCP clearing process in which they participate will comply with the 2004 CPSS-IOSCO Recommendations for CCPs. In October 2008 the dealers reaffirmed this commitment.

In November 2008 the European Commission formed a working group to improve the OTC derivative market infrastructure and identify the steps needed to facilitate the creation of a CCP for CDSs. The Commission also asked dealers to commit to using a European CCP for CDSs that reference a European reference entity or indices.

In the same month the PWG announced that the Federal Reserve System, the Commodity Futures Trading Commission and the Securities and Exchange Commission had signed a Memorandum of Understanding regarding CCPs for CDSs and jointly encouraged CCP developers and market participants to accelerate their efforts to establish a CCP for CDSs in the market. The PWG further stated that its "top near-term priority is to oversee the successful implementation of

CCP services for CDSs". The PWG continues to monitor progress on this objective.⁶⁸

Also in the same month the G20 issued a communiqué requesting finance ministers to formulate additional recommendations for "strengthening the resilience and transparency of credit derivatives markets and reducing their systemic risks, including by improving the infrastructure of over-the-counter markets".

On 18 December 2008 the Governing Council of the ECB considered the need to strengthen the infrastructure for OTC derivatives in view of their systemic importance and welcomed initiatives by the European Commission aimed at introducing European CCP clearing facilities for OTC credit derivatives. The 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.⁶⁹

In February 2009 nine dealers sent a letter to European Commissioner McCreevy committing to the use of a European CCP for European CDSs by 31 July 2009. The letter also committed the signatories to work closely with infrastructure providers, regulators and the European Commission to resolve outstanding technical, regulatory, legal and practical issues. The letter noted that each firm would make an individual choice on which central clearing house or houses might best meet its risk management objectives, subject to regulatory approval of any such clearing house in Europe. As two European CCPs had obtained the necessary regulatory approvals for clearing CDS as per the end of July 2009,

65 PWG, "Policy statement on financial market developments", March 2008.

66 Financial Stability Board, "Report of the Financial Stability Forum on Enhancing Market and Institutional Resilience", April 2008.

67 http://www.newyorkfed.org/newsevents/news/markets/2008/regulators_letter.pdf.

68 See <http://www.ustreas.gov/press/releases/hp1272.htm>.

69 See http://www.ecb.int/press/pr/date/2001/html/pr010927_2.en.html and <http://www.ecb.int/press/govdec/otherdec/2008/html/gc081219.en.html>.

the European Commission has communicated that it will monitor the migration of the CDS onto CCPs and will take account of the progress made by market participants in the CDS area when formulating its policy orientations for over-the-counter (OTC) derivatives in general.

Furthermore, an international group of regulators and central banks was formed in February 2009 to discuss possible information sharing arrangements and other methods of cooperation within the regulatory community with regard to CCPs. The group held a workshop on 17 April 2009 which was attended by representatives of other interested regulators and government authorities that are currently considering CDS market matters, to discuss the regulatory aspects of a CCP for CDSs and information needs of other authorities and the market more broadly. These discussions are continuing and are likely to result in a considerable increase in transparency as regards the transactions and risks of both regulators and the market, as CCPs and the TIW have responded to the group's requests for information. To date, seven clearing providers have publicly announced their intention to clear CDSs, as shown in Table 7.1 of which several have already started to offer their services.

The Tokyo Stock Exchange and the Tokyo Financial Exchange have also indicated that they

are developing proposals, though few details are currently available.

Both the NYSE LIFFE/BClear and LCH.Clearnet proposal and the ICE US Trust proposal have obtained the required regulatory approvals and they have launched their offerings.

In a statement on 16 June 2009, the ICE US Trust confirmed that they have cleared 12 thousand transactions with a total notional value of USD 1 trillion since operations began on 9 March 2009.

In July 2009, NYSE LIFFE/LCH.Clearnet announced that they were "reviewing" their CDS services.

All the CCPs listed above have established certain criteria for accepting a financial institution as a clearing member. They also require initial margins to operate in the market. Most of them monitor intraday trading and call for intraday margining when necessary. These CCPs calculate the mark-to-market positions of their members on at least a daily basis and adjust the margins (variation margin).

Moreover, most have established or intend to establish a guarantee fund, to which all members of the CCP will have to contribute. In most cases, this guarantee fund is not segregated,

Table 7.1 CDS clearing providers

Name of clearing house	Location	Regulated by	Expected launch date	Expected product available on launch date
ICE US Trust	United States	NY Fed, NY State Banking Dept	Already launched	US indices
NYSE LIFFE/BClear and LCH.Clearnet	United Kingdom	FSA	Already launched	European indices
CME	United States	CFTC and FSA	Shortly	US indices, European indices and constituent single names
ICE Clear Europe	United Kingdom	FSA	Already launched	European indices
Eurex	Germany	BaFin, Bundesbank and FSA	Already launched	European indices and constituent single names
LCH.Clearnet.SA	France	[College of European regulators]	End of 2009	European indices Constituent single names at a later stage

Source: BSC.

i.e. there is not a specific fund for the CDS market, but one single fund to cover possible losses in any market that is cleared by the CCP. However, at least one of the CCPs opting to clear the European CDS market offers a separate guarantee fund.

As mentioned above, all members will have to contribute a specific amount to the guarantee

fund, however, some CCPs have the right, in certain circumstances, to oblige clearing members to contribute a capped amount of additional default funding.

Among other risk management tools, some CCPs include pre-trade and post-trade controls and monitoring of the financial strength of their clearing members.

Box 15

ESCB/CESR RECOMMENDATIONS FOR SECURITIES SETTLEMENT SYSTEMS AND CENTRAL COUNTERPARTIES

On 3 June 2008 the Economic and Financial Affairs Council of the European Union (ECOFIN Council) invited the European System of Central Banks (ESCB) and the CESR to adapt and finalise the ESCB-CESR “Recommendations for securities clearing and settlement in the European Union” as soon as possible. In view of the financial stability risks posed by the growing scale of OTC derivatives exposures, and in particular credit derivatives exposures, the ECOFIN Council emphasised the need to support appropriate initiatives to reduce those risks, notably by developing one or more European CCPs to serve the OTC derivatives markets. Consequently, at its meeting on 2 December 2008, the ECOFIN Council mandated the ESCB and the CESR to adapt the recommendations for CCPs to explicitly address the risks of OTC derivatives, including CDSs.

On 22 May 2009 the Governing Council approved the ESCB/CESR Recommendations for securities settlement systems and central counterparties. The aim of this report is to promote competitive, efficient, safe and sound pan-European post-trading arrangements.

The ESCB/CESR Recommendations are based on the recommendations made by the Committee on Payment and Settlement Systems (CPSS) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) in November 2004.

They update those recommendations and adapt them to the European context. The report is divided into two parts, Part I deals with the recommendations on securities settlement and Part II contains the recommendations on CCPs. Both parts have a similar structure to the CPSS-IOSCO Recommendations. Part II consists of 15 recommendations on CCPs related to, among others, legal risk, participation requirements, management of credit exposures, margin requirements, default procedures, operational risks, governance, transparency and regulation and supervision.

In its final report in March 2009, the G20 Working Group 1 also recommended that the CPSS-IOSCO Recommendations be reviewed, in order to ensure that the infrastructure for central clearing and settlement for credit derivatives meets high prudential standards. Once this work is finalised, the ESCB/CESR Recommendations will be reviewed as well to ensure consistency.

The ESCB/CESR Recommendations are non-binding and are addressed to public authorities in the EU. These authorities would promote and monitor the application of the recommendations within their jurisdictions, however, the primary responsibility for ensuring the safe, sound and efficient operation of central securities depositories and CCPs lies with their designers, owners and operators. The CCP-related recommendations make special reference to OTC derivatives, in particular credit derivatives. In principle, the general recommendations for CCPs are designed to address the specific features of the risks inherent in the clearing of OTC derivatives, as most do not differ significantly from the risks involved in clearing on-exchange transactions. However, the risk management of CCPs dealing with OTC derivatives could differ, due to the greater complexity of these products and the relative illiquidity of certain contracts.

This is reflected in a number of recommendations, for example regarding credit events for CDSs and default management processes, the clearing of specific products, models for conducting margining, the structure of and contributions to a guarantee fund, and the way CCPs obtain and/or calculate prices that are needed as a basis for margin calculations.

On 20 July 2009 the Committee on Payment and Settlement Systems and the Technical Committee of the International Organization of Securities Commissions also announced that a working group had been established to review the application of the 2004 CPSS-IOSCO Recommendations for Central Counterparties to clearing arrangements for OTC derivatives. The working group will discuss key issues potentially arising when CCPs (including the new CCPs for CDSs) provide central clearing services for OTC derivatives and will, where necessary, offer guidance on how CCPs for OTC derivatives may meet the standards set out by the recommendations.

Furthermore, the working group will identify any areas in which the recommendations might be strengthened or expanded to better address risks associated with the central clearing of OTC derivatives.

7.2 BILATERAL COUNTERPARTY RISK MANAGEMENT

While the establishment of a CCP will considerably increase the robustness of the infrastructure for CDSs, it should be noted that not all CDS products are suitable for clearing. To be eligible for clearing, a product must, as a minimum, be liquid, have price transparency and be standardised. It must also be possible to model its characteristics in risk management practices. While the major CDS indices do qualify, some products, such as those that involve the more unusual indices, as well as single-name CDSs and bespoke CDS transactions, will not be suitable for clearing.

These transactions will remain within the bilateral infrastructure. It is therefore imperative that the bilateral counterparty risk management processes be used as much as possible and used consistently across the market. Ideally, bilateral processes should be based on the robust risk management processes used by central clearing counterparties, such as the consistent and transparent application of collateral arrangements that are akin to initial and variation margin calculations.

The first step in efficient collateral management processes is to use a netting agreement that allows exposures of in-the-money and out-of-the-money positions between two parties to be

netted together to give a single exposure figure. The increased use of such bilateral agreements is to be encouraged.

The next step is to identify and reconcile valuations and trade terms of portfolios between parties. This step is carried out by third-party service providers. In a letter in July 2008 to the Federal Reserve, major dealers committed themselves to implementing ISDA best practices for portfolio reconciliation by 31 December 2008, including weekly inter-dealer reconciliations of collateralised portfolios exceeding 5,000 trades. In a letter to the Federal Reserve in June 2009, the major dealers improved on this commitment and agreed to execute daily reconciliations of collateralised portfolios in excess of 500 trades.

The major dealers have also begun collecting and reporting to supervisors monthly metrics regarding their portfolio reconciliation activities since February 2009, which has enabled supervisors to track the performance of firms in this regard. Dealers have extended this commitment by agreeing to implement revised reporting thresholds comprising fixed US dollar amounts supplemented with risk-based deviation for portfolio reconciliation purposes.

Furthermore, those dealers have also agreed to publish a feasibility study by October 2009 on market-wide portfolio reconciliations that will set out how the practice of performing regular portfolio reconciliations can be extended beyond the current group of dealers to include smaller market participants.

Any counterparty risk management process that leaves an unsecured exposure is likely to be in the regulatory spotlight. Therefore, in line with the commitment by the major dealers, the ISDA is currently developing new processes for more effective valuation dispute resolution.

7.3 OPERATIONAL RISK

BACKLOGS

Operational risks, especially those that result in confirmation backlogs, have been the focus of increased regulatory attention since 2005. As a consequence, a group of international supervisors, including the FSA, BaFin and the Federal Reserve Bank of New York, alongside market participants, has developed various operational targets for major dealers, aimed at reducing confirmation backlogs and improving confirmation and novation processes.

Supervisors monitor dealers' monthly performance against these targets on a "comply or explain" basis. Considerable improvements in operational efficiency have been seen as a result of this work. For example, the volume of outstanding confirmations has been reduced by 98% since 2005.

MARKET DEVELOPMENTS: ELECTRONIC CONFIRMATION AND CENTRALISED STORAGE OF ELECTRONIC TRADE DATA

Since 2005 the operational targets have been periodically updated and their scope broadened to include other operational developments such as e-confirmation and the increased use of "compression" services.

Furthermore, the DTCC has introduced the Deriv/Serv function and established the TIW. Using the Deriv/Serv interface, participants can electronically confirm the details of their trades. Electronic confirmations remove the need for firms to use paper confirmation processes which are onerous and prone to delays. 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 is particularly relevant for CDSs owing to the number of corporate events that can influence the contracts.

One consequence of the Deriv/Serv function is the fact that, once the terms are agreed, what is referred to as the “golden copy” of the trade is created. This golden copy is the legal agreement and its terms are recorded in the TIW which acts as a central repository. The creation of the golden copy reduces the risk of counterparties disagreeing on the terms of the trade at a later date.

However, the TIW does not have complete records of the population of older trades for a variety of reasons, including a lack of the necessary standardisation of those legacy trades and some reluctance among firms to provide the resources needed to enable the records to be backloaded. In their October 2008 letter, the major US dealers committed to the universal use of the TIW for all eligible products and also committed to a backloading programme. Major dealers have committed to complete the backloading of their legacy portfolios into the TIW for all counterparties by 30 November 2009. In their June 2009 letter, the dealers committed to the universal reporting of all credit derivatives (including bespoke transactions) to the TIW by 17 July 2009. This will provide regulators with a central source of data for all credit derivative trades, with the possible exception of trades between two non-dealers.

MARKET DEVELOPMENTS: LIFE CYCLE PROCESSING

Central data depositories play an important role in the processing of CDS transactions. The information on trades processed by data depositories can be stored in the centralised electronic infrastructure used for the post-trade processing of credit derivatives over their life cycles. This includes details of confirmations, premium payments and credit event settlements, as well as deal maintenance and credit event processing. The infrastructure may also be extended to accommodate other OTC derivatives, such as those based on interest rates and equity prices.

The data repository calculates the net premium and net bilateral cash settlement amounts owed

by its participants. By employing the Continuous Linked Settlement payment system, which permits the multilateral termination of these payments, the ultimate amount of such payments can be substantially reduced, which can remove liquidity pressures in times of stress.

The benefits of data depositories have also been shown during the 11 credit events in 2008 and 35 so far in 2009 (with ten credit events occurring simultaneously at one point) given the availability of current infrastructure. Significant operational strain would have resulted had data depositories such as Deriv/Serve not taken on a considerable share of the work.

The signatories to the October 2008 letter committed themselves to using the TIW to process major life cycle events for all electronically eligible confirmable trades, to the extent that this functionality is developed within the TIW and the DTCC operating procedures are updated.

Not all of the CCPs intend to use the TIW. Instead, they will use their own proprietary systems. In addition, it is possible that a competitor to the DTCC may emerge. In either case, settlements could be performed equally well by other real-time gross settlement systems operating in commercial and central bank money, for example TARGET2.

7.4 CDS CONTRACT CHANGES

A major concern for the operational robustness of the CDS market was the requirement for bonds and loans to be delivered to the seller of protection in return for payment of their face value following a credit event. Since the gross notional value of CDSs outstrips the amount of bonds outstanding in many cases, there were significant concerns that such a requirement would create an artificial squeeze on the value of the bonds and have a negative impact on the integrity of the CDS contract.

“Big Bang Day” on 8 April 2009 saw the introduction of the Auction Supplement and the

amendments contained in the Big Bang Protocol, as well as the launch of the new standardised North American contract (SNAC).

The Auction Supplement and the Protocol introduce the Determination Committee and amend new and existing trades to use a method of settlement that involves a cash payment based on the valuation of the bond or loan in an auction process. This could in principle remove the concerns regarding bond and loan delivery.

In June-July 2009 there were two new developments in the European CDS market. The first was the standardisation of coupons and the second was the launch of the Small Bang Protocol.

The new coupons are of 25, 100, 500 and 1,000 basis points, though it appears that, for liquid single-name CDSs, the market has already moved to using 100 and 500 basis point coupons almost exclusively. This change brings the European market into line with the SNAC.

The Small Bang Protocol, which applies to both existing and new adhering trades, amends the settlement mechanism in the event of a restructuring credit event. Currently, settlement would be via bond delivery, which raises concerns regarding bond availability and the possibility of squeeze that prompted the introduction of the auction process for other credit events.

Unfortunately, due to the technicalities on the range of bonds that can be delivered, it would be difficult to apply an auction process for a restructuring credit event, as multiple auctions would need to be held. The Small Bang Protocol changes, whereby trades with differing maturities are grouped into one “bucket”, reduce the number of auctions needed and therefore minimise the practical difficulties. This will allow an auction process to be used for the settlement of restructuring credit events.

The Small Bang took effect on 27 July 2009 and has seen similar adherence rates for market participants as the Big Bang (Box 16).

Box 16

BIG BANG PROTOCOL AND AUCTION SUPPLEMENT

The Big Bang Protocol and Auction Supplement both introduce the same three major changes.

First, they introduce the concept of the ISDA Determination Committee which will make market-wide binding decisions with respect to, inter alia, credit events succession events and whether to hold one or more auctions. Previously, such decisions were made by one of the two bilateral counterparties acting as the calculation agent.

The Determination Committee consists of eight global dealers, two regional dealers, five non-dealer ISDA members, one non-voting dealer (for the first year, there will be two non-voting dealers), one non-voting regional dealer per region and one non-voting non-dealer member. Dealers are appointed based on trading volumes. Buy-side participants are chosen from the buy-side committee, which includes assets under management as one of its criteria. If the Determination Committee is unable to reach a conclusion under its terms of reference which, in some cases, requires an 80% majority, the matter goes for an external review. External reviewers are selected at random from a pool of candidates nominated by any ISDA member and confirmed by a majority of the Determination Committee. The decision and votes are published by the Determination Committee once a conclusion is reached.

Second, they bind participants to using the auction settlement methodology (rather than physical settlement, which was the previous standard) for bankruptcy and failure to pay credit events. The Small Bang Protocol, which will introduce similar processes for restructuring credit events (though with multiple auctions), took effect on 27 July 2009.

Third, they create a rolling “look-back period” for both credit events and succession events. This means that all contracts will be fungible ongoing rather than for a period that is a function of the trade date, as was previously the case.

The Big Bang Protocol applies these changes to existing contracts, although there are some differences regarding when the rolling look-back periods come into effect in order to avoid inadvertently increasing the on-risk period for an existing transaction. The Auction Supplement applies these changes to any new trade where they are incorporated by reference.

The adherence rate across the market has been extremely high for the Big Bang Protocol, with 2,092 entities signing up as at 8 April 2009. Dealers have reported that, on average, 86.31% of their global clients and 98.44% of all of their transactions have adhered.

7.5 MARKET DEVELOPMENTS: IMPACT OF CDS CONTRACT CHANGES

The introduction of the ISDA Determination Committee is a significant amendment, bringing a legally binding agreement to a previously entirely bilateral process, which may improve the functioning and transparency of the market. The changes to the settlement mechanism may also improve the certainty of processes following a credit event and remove the operational burden of ad hoc processes. However, given the legally binding agreement of market participants and the central role that will be played by the Determination Committee in areas such as the determination of credit events and deliverable obligations, it is important that the decision

mechanisms of the Determination Committee be transparent and accountable vis-à-vis market participants, possibly combined with an appropriate level of supervisory insight, to ensure that market participants from various market segments have a sound and level playing field.

The amendment to standard coupons for US single-name CDSs and the market-wide rolling look-back periods should both improve the fungibility of contracts for clearing and the ability of the market to “compress” (i.e. terminate or net) redundant positions. This should allow the gross notional amount of trades outstanding to be reduced even further and should therefore reduce counterparty risk, capital requirements and operational burdens.

Box 17

REMOVAL OF THE RESTRUCTURING CREDIT EVENT FROM CDS CONTRACTS AND POSSIBLE IMPLICATIONS

One of the most significant changes that has occurred recently in the CDS market is the introduction of a new standard for single-name contracts in the United States, in which restructuring has been removed as a credit event. However, for some specific names, contracts including restructuring credit events may still be available, though a liquidity and risk premium

may be charged. For the time being, restructuring will remain in place for European single-name and index CDSs.

Under the Basel II rules, banks would be subject to a haircut of 40% on their capital relief when hedging a cash position if the hedging CDS did not include restructuring credit events. For banks sensitive to such capital requirements, it is possible that, in order to avoid the additional capital charge, such banks would need to use a non-standard contract. In order to assess the likelihood of this, the qualitative questionnaire on which this report is based asked European banks to indicate the impact that this change to the US contract would have on their hedging strategy.

The majority of banks responded that it would have a minimal impact on their hedging strategy. In many cases this is because most of their business is transacted on European names, for which restructuring is still included as a credit event. For the trading business, it was generally felt that all parties would use the new standard contract. Some respondents also noted that many US names had been trading without restructuring for some time. However, it was noted by some that respondents and clients hedging loan books, seeking to reduce capital relief requirements, would probably still require the inclusion of restructuring credit events until the regulatory requirements were changed. Such non-standard contracts are unlikely to be eligible for clearing. Several respondents noted that, in their view, the regulatory capital treatment was overly punitive and should be reassessed by regulators. Thus, if this haircut were to remain, it could result in disadvantages for European banks operating under the Basel framework, by comparison with US peers to which that haircut did not apply.

It can be noted that there is no common legal equivalent of the U.S. Chapter 11 bankruptcy protection in Europe. A bankruptcy will instead in most cases be preceded by a restructuring effort of the ailing company (see Box 13). The restructuring clause is thus a more relevant credit event in Europe and is included in close to all European CDS (99.6%, as compared to 73% for U.S names).¹

The reason that the inclusion of restructuring credit events is a problem for clearing relates to the method by which the CDS contract is settled once a restructuring credit event has occurred. The reference entity is still solvent, meaning that there will be a price curve for outstanding debt – i.e. the longer-dated bonds and loans will be cheaper than those with a shorter maturity. A buyer of protection will want to deliver the cheapest bond in order to maximise the protection payment due from the seller. Therefore, to avoid the seller being penalised, a maturity limitation is applied to deliverable loans or bonds. The maturity caps for US and European names differ, but both are a function of the maturity of the CDS contract. A further difficulty stems from the asymmetry of the deliverable loans or bonds depending on which party triggers the contract. If the protection buyer triggers the contract, the aforementioned maturity limitation applies, whereas if the seller triggers it there is no maturity cap. Together, these two aspects mean that for any one restructuring credit event a large number of bonds and loans will need to be valued in order to settle each of the contracts on the underlying reference entity.

Dealers have agreed on a framework under which the contracts would be grouped into five maturity “buckets” but would retain the fall-back option of physical delivery of bonds if an auction is not held. This would significantly reduce the number of auctions that would need to be

¹ Source: Markit.

held, which would be beneficial to both the bilateral and the cleared CDS market. This change has been implemented via a protocol amending legacy trades. That protocol, the “Small Bang Protocol”, took effect on 27 July 2009.

The clearing houses will each need to determine a manner of allocation if only some contracts are triggered (a functionality that the market insists is maintained) and also the form of the index following a partially triggered event that will provide appropriate liquidity.

7.6 MARKET INTEGRITY

INFORMATION ON POSITIONS UNDERTAKEN

Market integrity concerns the ability of investors to transact in a fair and informed market where prices reflect information. The chief concern with regard to market integrity is the lack of information on firms’ and sectors’ CDS positions. During Lehman Brothers’ settlement, this lack of transparency contributed to the deterioration in general market confidence, which affected its efficiency. This is clearly cause for concern from the financial stability perspective.

A distinction should be made between sufficient information for (i) market participants’ decision-making processes, and (ii) supervisors’ monitoring of undesirable concentrations of risk.

MARKET TRANSPARENCY AND DISCLOSURE TO SUPERVISORS

Some commentators have suggested that increased transparency can hamper the working of the market.

This could be the case where a contract has limited liquidity, and disclosing volume and price data could reveal a specific firm’s commercial strategies. However, with greater transparency, price and volume data will better reflect the liquidity of the product, which will make it easier for market participants to adjust their positions and related capital or collateral.

The CESR has recently indicated that most market participants would welcome increased transparency with regard to CDSs, insofar as this would provide information about the scale of credit transfers, which would also increase

liquidity. However, some market participants have also stressed the possible negative impact on liquidity and remain in favour of self-regulatory initiatives.⁷⁰

As well as the publicly available information that supervisors may obtain, they also have access to information on CDS markets through the institutions under their supervision. However, this information is partial, as it does not cover all market participants. Therefore, it may be difficult to properly evaluate concentrations of risk with individual institutions or risks to financial stability in general. In the light of the above, where aggregate data are already collected by infrastructure providers in the course of their normal business, those data should be made available to all interested supervisors for financial stability purposes.

TRADE REPOSITORY DATA

Until recently it was difficult to obtain sufficient position information for either purpose.

In November 2008 the DTCC agreed with regulators to publish position data for CDS transactions within the TIW. Currently the TIW supplies non-public data to participants and non-downloadable public data. However, further information, such as positions by sector, geographical location and credit ratings, may further assist in improving market transparency if it is made public and published in a downloadable form. In addition, some transactions, such as bespoke synthetic CDO trades, are not included in the TIW and are therefore missing from the data provided.

⁷⁰ “Transparency of corporate bond, structured finance product and credit derivatives markets”, CESR/09-349, 30 June 2009.

The inclusion of these trades would improve the reliability of the data and the analysis that can be performed by regulators and the market. Major dealers committed to regulators to complete the backloading of legacy transactions by 17 July 2009. This will enable supervisors to perform analysis on the entire universe of CDS transactions.

Increased transparency in the market will help to enhance its efficiency. For this reason, it is important that supervisors, in cooperation with service providers and other market participants, determine the further steps that need to be taken to improve and increase the publication of position data.

Currently, opening up position data to the supervisory community is difficult, since the TIW is unregulated. However, the TIW has recently filed applications to establish a limited-purpose trust company that will house the functions of the TIW for credit derivatives. The new company, to be called “The Warehouse Trust Company LLC”, has applied for membership of the Federal Reserve System and has filed an application with the New York State Banking Department (NYSBD) to form a limited-purpose trust company which will become a wholly owned subsidiary of DTCC Deriv/SERV LLC. The new trust company will establish a subsidiary in Europe to facilitate the offering of regulated warehouse services in Europe. Many national regulators have already established informal relationships with the TIW and are able to request it to provide information.

The use of proprietary and often confidential information and how such information can be shared within the regulatory community is being discussed within a working group of international regulators. It is clear that sharing position data within the supervisory community in the interests of identifying concentrated derivative positions is important for an overview of global financial stability.

ACCOUNTING TRANSPARENCY

In the European Union, financial entities have to present their consolidated annual statements in accordance with the International Financial Reporting Standards (IFRS – previously “IAS”). The IFRS are issued by the International Accounting Standards Board (IASB). The IASB, together with the Federal Accounting Standards Board (FASB) that issues the standards applicable in the United States, are the two main accounting standard-setters at the international level.

The action plan approved in November 2008 by the leaders of the G20 in Washington D.C. included a number of recommendations addressed to accounting standards bodies asking them to work to enhance guidance for the valuation of securities, taking into account the valuation of complex illiquid products, and to enhance the required disclosure to market participants. They should also work towards the objective of creating a single high quality global standard. Following these recommendations, the IASB and the FASB have published guidance on the application of fair value in illiquid market conditions and are in the process of enhancing guidance for fair value measurement and disclosure more generally. At their April 2009 meeting in London, the leaders of the G20 agreed “to call on the accounting standard-setters to work urgently with supervisors and regulators to improve standards on valuation and provisioning and achieve a single set of high quality global accounting standards”.

In the European Union there are no specific accounting rules that apply to CDSs, and thus their measurement is performed according to the general standards for financial instruments – IAS 32, IAS 39 and IFRS 7. According to these standards, CDSs are measured at fair value throughout their lifetime, which is reflected in the asset value and profit and loss account.⁷¹

⁷¹ In a very few cases, CDSs comply with IAS 39.9 and therefore can be considered a financial guarantee and measured in accordance with the standards applicable to guarantees.

When CDSs are used for hedging purposes, and provided they comply with the requirements established for hedging instruments, they are measured according to the specific criteria for hedge accounting.

The new guidelines issued by the IASB on the application of fair value have not modified the accounting treatment of CDSs. The draft proposals published for public comment by the IASB do not include any change in the accounting or disclosure of these operations. However, the IASB plans to issue new accounting standards for financial instruments in the course of 2009. The new rules could affect the accounting of CDS instruments when used for hedging purposes.

In the United States, the FASB has included amendments to its accounting standards that increase disclosure requirements for CDSs. It has also issued new guidance for fair value accounting.⁷²

EXCHANGE TRADING

The exchange or transparent electronic trading of CDSs should improve the pre-trade transparency and liquidity of the market. Pre-trade price information is currently provided by a range of financial information services companies as well as by dealers and inter-dealer brokers. However, to date, the existing exchange-tradable products have not been supported by the inter-dealer market and therefore have not attracted the necessary liquidity.

The G20 communiqué includes the statement that “[s]upervisors and regulators ... should ... insist that market participants support exchange-traded or electronic trading platforms for CDS contracts”. The recent statement by the US Treasury Department reiterated this objective by supporting the movement of standardised trades onto regulated exchanges and regulated transparent electronic trade execution systems.

This is likely to become a prime area of regulatory interest for all OTC derivatives, including CDSs, in the near future. Commercial

CDS service providers may also be given more incentives to expand their disclosure regarding price setting, which is a key factor in accurate valuation and the level playing field between dealers and non-dealers (see Box 11).

7.7 CAPITAL REQUIREMENTS

On 13 July 2009 the Basel Committee on Banking Supervision presented, revisions to the Basel II market risk framework, including an incremental risk capital charge for unsecuritised credit products supplementing the current value-at-risk based trading book framework.⁷³ The incremental risk charge relates to migration and default risk and is a response to the increasing amount of exposure in banks’ trading books to credit risk-related and often illiquid products the risk of which is not reflected in value-at-risk.

The financial crisis has led to worries about whether the capital requirements for counterparty credit risk are sufficient.

In times of stress (affecting the whole economy or individual names), CDS premia increase rapidly. For instance, in the period when the imminent failure of AIG was anticipated, the premium on a CDS referencing AIG increased within days to about 3,000 basis points. These potential increases should be sufficiently reflected in the capital requirements for specific market risk and for counterparty risk. With regard to the calculations for specific market risk, no bank has thus far been able to model migration and default risk in a satisfactory way from a prudential point of view. Regarding the calculations for counterparty risk, the current period of stress is difficult to take into account in these calculations. Therefore, the further

72 On 12 September 2008 the FASB issued FASB Staff Position No 133-1 and FIN 45-4, “Disclosures about Credit Derivatives and Certain Guarantees: An Amendment of FASB Statement No 133 and FASB Interpretation No 45” and clarified the effective date of FASB Statement No 161, in regards to extended disclosures by sellers of credit derivatives, including credit derivatives embedded in hybrid instruments.

73 “Revisions to the Basel II market risk framework”, Basel Committee on Banking Supervision, July 2009.

regulatory work being undertaken to assess the adequacy of capital requirements for these risk categories – as well as to address the inherent pro-cyclicality embedded in the value-at-risk modelling methodology employed under the advanced measurement approach – is opportune and welcome.

In January 2009 European Commissioner Charlie McCreevy proposed that a provision for mandatory clearing be inserted into the reform of EU bank capital rules, resulting in “clearing of CDSs in a central counterparty in the EU”. An amendment of this kind was proposed by Pervenche Berès, the Chair of the Committee on Economic and Monetary Affairs of the European Parliament, but was amended during subsequent negotiations to a requirement for a report from the European Commission.

The report published in July by the European Commission, focuses on measures to enhance the transparency of OTC markets, mitigate counterparty risks and more generally to reduce the overall risks. It considers all relevant proposals, taking into account parallel initiatives at the global level where appropriate. The amendments to the Capital Requirements Directive also encourage the establishment and development of CCPs in the EU, subject to high operational and prudential standards and effective supervision.

It is also notable that where restructuring is no longer included as a credit event in some contracts (such as the new standardised North American contract), under the Basel II rules a maximum of 60% of the protection is recognised. As noted in the responses to our qualitative questionnaire, it has been suggested that this 40% haircut for CDSs without a restructuring credit event clause should be reassessed.

There may be reluctance in the current environment to relax any capital requirements. Therefore, an alternative would be to fundamentally re-evaluate the capital treatment for all CDSs and other trading book products to ensure that an appropriate amount of capital is being held by firms. This may bring about more consistency in the capital treatment of CDSs, including contracts without a restructuring credit event clause.

7.8 CONCLUSIONS

First, a comprehensive review of position transparency should be considered for the benefit of regulators and the market as a whole. The objective should be to enhance market transparency with respect to position-taking and increase incentives for prudent self-discipline by market participants.

Second, given the establishment of one or more CCPs for CDSs in Europe, regulatory attention may focus on how market participants can be encouraged to use the clearing services as soon as they are available. In the United States, under the framework proposed by the Treasury Department, there is a proposal to “require the clearing of all standardised OTC derivatives through regulated CCPs”, although the details of this proposal are still to be spelled out.

Third, an impact assessment of bilateral collateral management processes should be conducted as quickly and comprehensively as possible and a roadmap for improvements should be established.

Fourth, in the light of the issues raised by the current functioning of the CDS market and the shortcomings in risk management practices, the capital requirements for market risks have been revised in July 2009 within the Basel framework.

Box 18

OVERVIEW OF THE ISDA AUCTION PROCESS

CDSs under which a credit event has occurred are settled in one of two ways: by physical settlement (i.e. the delivery of debt obligations in exchange for their outstanding principal balance) or by cash settlement (i.e. a payment to the protection buyer of the difference between an agreed reference price for the debt obligations – typically 100% – and the market value of those obligations at the time of settlement).¹

Physical settlement can both cause and become impaired by market illiquidity for the underlying bonds and loans. This occurs most notably under “short squeeze” conditions where cash bond prices increase as protection buyers all simultaneously seek to buy the same debt obligations for use in settling their CDSs.² The credit event auction process was launched in 2005 by Markit and Creditex in collaboration with the ISDA and major credit derivative dealers to facilitate the settlement of credit derivative contracts in the event of a corporate default. At its simplest, it consists of cash settling transactions using a market value that is generated by a set of market transactions. The parties’ agreement to cash settle their trades using this derived market value, together with their potential participation in the price-generating market transactions, constitutes a “CDS protocol”. Each CDS protocol consists of two price-generating auctions (which have been termed an “inside market auction” and an “open market auction”), separated by an “open-interest determination” process in which the unsatisfied, or “open,” buy-side or sell-side interest in the protocol’s deliverable obligations (DOs) is determined.

Inside market auction

Only dealers participate in the first auction. They each submit a bid and an offer for a predetermined quantity (i.e. outstanding principal amount) of the DOs designated by the ISDA as eligible for the purposes of the specific CDS protocol. An individual dealer’s bid and offer cannot differ by more than a predetermined spread.

The quality of the bids and offers is then assessed by pairing the best bid and best offer, the second-best bid and the second-best offer, etc. Of the pairs of non-touching and non-crossing bids and offers, the half that exhibit the narrowest bid-offer spreads are used to calculate a mid-market price called the inside market mid-point, which is used as a constraint on the final price that is to be determined in the open market auction. The excess demand to buy or sell that emerges from this comparison constitutes the market “open interest”, for which participants will offer or bid in the open market auction, which is essentially a modified Dutch auction.

¹ “A Plain English Summary of Credit Default Swap Settlement Protocol”, Cadwalader, 18 November 2008.

² The case of Delphi Corp. is perhaps the best example of this. At the time of Delphi’s bankruptcy filing in 2005, it had approximately USD 2 billion in bonds outstanding. At the same time, the notional amount of CDSs written on Delphi’s bonds was over USD 25 billion, evidencing considerable synthetic exposure. The triggering of the credit event set off a short squeeze as protection buyers scrambled to acquire the Delphi bonds necessary to settle their CDS contracts and the price of the bonds spiked. When it became clear that physical settlement would not be possible given the large notional amount of outstanding CDS, numerous market participants subsequently agreed to amend their CDS contracts to provide for cash settlement rather than physical delivery.

Open market auction

After the direction (buy or sell) and quantity of the open interest is determined and announced, anyone that wishes to bid or offer for a portion of that interest may submit a quantity and limit price to buy or sell DOs, depending on whether the open interest is to sell or to buy. These limit orders will be matched against the open interest in the open market auction. The inside market mid-point is also referenced as a bid limit level in the open market auction in order to arrive at the appropriate market clearing price. The market clearing price in that auction becomes the final price to be used in the physical settlement of all the physical settlement requests, limit orders and inside market quotes (either bids or offers, depending on the direction of the open interest) and the cash settlement of all the CDSs covered by the protocol.

Box 19

INSURANCE COMPANIES AND CDS ACTIVITY IN EUROPE

Insurance companies in Europe operate under the Solvency I regime, which is largely based on two EU directives dating from the 1970s.¹ These two directives (on life assurance and non-life insurance) require insurance companies' investments to be profitable, liquid and safe. It is up to each EU Member State to establish detailed rules about asset delimitations.

Compared with Basel I, the EU insurance regulatory framework limits the trading of naked CDSs in terms of both the purpose and extent of their use by insurance companies.² These restrictions have often been referred to as constituting a potential "firewall" against the financial turmoil. Investments in derivative instruments are usually permitted if they contribute to reducing investment risks or facilitate efficient portfolio management. CDSs should thus be used passively or for hedging purposes, rather than for active trading (covered CDSs). These regulations make it difficult for insurance companies in the EU to sell CDSs. This is particularly the case in Germany, France, the Netherlands and the United Kingdom.

In spite of these limitations on the direct trading of CDSs, an EU insurer can legally obtain exposure to CDSs in other ways.

First, the insurer may hold structured products in which CDSs are embedded, as in the case of synthetic CDOs. However, these instruments are subject to portfolio limitations. Financial instruments with low liquidity which are not traded on a regulated market face stricter rules, such as alternative investments in hedge funds, private equity-linked products and credit risk transfer products. These portfolio limitations are one of the possible reasons why structured finance products (i.e. products in which CDSs are embedded) have remained relatively limited in the EU insurance sector.

Second, EU insurance groups or financial conglomerates can also obtain exposure to CDSs by owning or operating subsidiaries in another sector (as in the case of AIG Financial Products) or a different jurisdiction (as in the case of the monoline guarantor FSA Inc.).

1 The new Solvency II regime, which is more in line with the Basel II framework, will enter into force in 2012 for European insurance companies.

2 See the Joint Forum report of 2005 on the use of credit risk transfers across sectors.

Nevertheless, according to the BIS data, the amount of CDS sold by insurance companies to banks is very limited, at 1% of the total amounts bought by banking sector.

National legislation

In the Netherlands, the legislation lays down maximum investment limits for certain categories of permitted assets for insurers, expressed as percentages of the technical provisions. No more than 5% may be invested in loans without collateral or other security obtained from parties other than credit institutions, insurers and investment schemes within the EU. Insofar as bonds, shares and money and capital market instruments are not traded on a regulated market, total investment in these assets may not exceed 10%.³

In Germany, the sale of CDSs or total return swaps by insurers is not permitted. Insurers may only invest (e.g. buy protection) a maximum of 7.5% of their entire financial assets in credit risk transfer products. Nevertheless, limit is far from being reached, as the average figure in 2007 was 1.6% of capital investment in the sector.⁴

Spanish insurance regulations do not include specific rules for CDSs, therefore, the general rules for derivatives apply. According to these rules, Spanish insurance companies can operate with derivatives as long as they comply with limits set for their whole portfolio of derivatives and structured products in which derivatives are embedded, and with individual limits, for diversification reasons, on market risk and counterparty risk.

In France, the legislation stipulates that insurance companies cannot invest in speculative CDSs (other than to hedge). In addition, funded positions are permitted but only a maximum of 10% of the investment portfolio can be invested in bonds or other assets not issued on a regulated market.

In the United Kingdom, insurers must demonstrate that any derivative holdings they have are for the purpose of risk reduction or efficient portfolio management.

³ See De Nederlandsche Bank's "Open Book on Supervision".

⁴ See the BaFin Annual Report 2007, Chapter IV, "Supervision of insurance undertakings and pension funds".

Box 20

THE STANDARD NORTH AMERICAN CONTRACT

Big Bang Day also saw the launch of the new standard North American contract (SNAC). This made two major changes to the way in which US single-name contracts are traded. First, the SNAC does not include restructuring credit events. For US underlying reference entities, this event is felt by many market participants to have little economic value, as, in the United States, most restructuring would be implemented under Chapter 11 bankruptcy provisions. Therefore, almost all restructuring credit events would qualify as bankruptcy credit events, making the restructuring credit event redundant. Second, the SNAC will trade with only two standard spreads – 100 basis points and 500 basis points – and the market will no longer execute each new contract at a new market spread, but will instead trade at the closest of these two spreads to the market spread and then pay an upfront fee to adjust to the market spread's net present value.

