



Price Formation on the CDS Market: Lessons of the Sovereign Debt Crisis (2010-)

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CONTENTS

ABSTRACT	4
INTRODUCTION	5
1 FUNCTIONING OF THE CDS MARKET AND CHANGES SINCE 2008	6
1.1 CDS MARKET PRINCIPLES AND FUNCTIONING	6
1.2 IMPROVEMENTS MADE TO THE MARKET SINCE 2008	7
2 ARBITRAGE POSSIBILITIES BETWEEN CDS AND BONDS.....	9
2.1 THE ECONOMIC RELATIONSHIP BETWEEN A CDS AND A BOND	9
2.2 THE DIFFICULTIES OF ARBITRAGE	12
3 IS THERE A CORRELATION BETWEEN CDS SPREADS AND BOND SPREADS?	12
3.1 THE ACADEMIC VIEWPOINT	12
3.2 THE MARKET PLAYER VIEWPOINT.....	13
3.3 ANALYSIS OF CDS AND BOND SPREADS.....	14
3.3.1 CDS bond basis comparison between sovereign issuers and corporates	14
3.3.2 Basis trends for different Euro Zone sovereign issuers	15
3.3.3 Correlation between bond spreads and CDS spreads.....	16
4 PRICE SETTING ON THE CDS MARKET.....	17
4.1 THE CDS MARKET REMAINS CONCENTRATED AND LACKING IN TRANSPARENCY	17
4.2 BID-ASK SPREAD TRENDS FOR CDS AND BONDS (FRANCE AND GERMANY)	18
5 SOVEREIGN CDS: PARTICULAR ISSUES.....	20
5.1 A DISCONTINUITY ZONE CLOSE TO DEFAULT.....	20
5.2 THE IMPORTANT AND GROWING ROLE OF CVA DESKS	20
BIBLIOGRAPHY	22

ABSTRACT

Further to recent trends in CDS prices and sovereign bond yields, this memo looks into the subject of price formation on CDS markets, notably on sovereign issuers. Interviews were conducted on this subject with operators on these markets.

Operators agreed that for Germany and the United States, recent CDS market trends have had no impact on the financing costs of these States. This matches the findings of academic research which has not yet established a causal link between the CDS prices and bond yields of the best-rated sovereign issuers. The sovereign CDS market is still lacking in depth compared with bond markets, arbitrage possibilities are costly and risky and the operators are not necessarily the same on the two markets. The analyses that have been conducted, especially over the recent period, confirm that neither the CDS nor the bond market can be shown to lead the other. They also show that as long as spread levels remain low, correlations between CDS market and bond market are weak: as long as default risks seem to be contained, bonds play their role as a refuge. However, when sovereign risk rises sharply and spreads reach a certain level, bonds lose their refuge function and a correlation appears. France would seem to have been in such a situation since autumn 2011.

Aside from the link between spreads on CDS and on bonds, the CDS market continues to lack transparency and remains concentrated. For CDS on France, 80% of contracts have one of the 5 main market participants as a counterparty and that figure reaches 97% of contracts with one of the 10 main participants. Price formation on sovereign CDS is also influenced by perceptions of the actual cover provided by these products in the event of default and by the important role of the activities of the main banks to hedge their counterparty risk.

INTRODUCTION

Further to recent trends in CDS prices and sovereign bond yields, this memo looks into the subject of price formation on CDS markets, notably on sovereign issuers. Interviews were conducted on this subject with operators on these markets.

An overview of the functioning of the CDS market and of the major structural changes it has been through over the last few years are presented in the first section. After a presentation of the theoretical link between CDS and bonds and of arbitrage possibilities between the two products, the links actually observed on sovereign markets are analysed from the academic, professional and statistical viewpoints. Finally, the following two sections go over certain specific features of the CDS market that can have an impact on prices: in addition to the lack of transparency and high level of concentration of the market, the questions of the actual protection afforded by sovereign CDS and of the changes in prudential rules on counterparty risk and their influence on demand are also addressed.

1 FUNCTIONING OF THE CDS MARKET AND CHANGES SINCE 2008

1.1 CDS market principles and functioning

A Credit Default Swap is an agreement between two counterparties relating to a reference issuer. The CDS buyer pays the CDS seller a periodic fee (which is a fraction of the nominal of the CDS) throughout the duration of the contract (standard contracts have a five-year term and, for sovereign CDS, a nominal of \$10 million). In return, the seller of the CDS must pay the buyer the nominal value in the event of a default by the reference issuer.

These products were initially designed as a form of protection against default on bonds: the buyer of the CDS would buy protection to guarantee payment of the nominal value of their bond in the event of default. On payment of the nominal value by the protection seller in cases of default, the buyer of the CDS (and therefore buyer of the protection) would also deliver the underlying bonds to the seller (to allow the seller to benefit from any value that might be recovered from the bonds in question). However, buyers of protection could subscribe a CDS without being exposed directly to the underlying credit risk. This enabled investors to transfer synthetic credit risk exposure to counterparties at a lesser cost.¹

As these markets were exclusively over the counter, the only way of reducing a position taken via a CDS was to subscribe another CDS in the opposite direction, often with a different counterparty. Gross notional amounts outstanding therefore grew very considerably, far exceeding net notional amounts² and making the market very difficult to read for participants and regulators alike.

Although presented by the industry as a risk diversification tool, ultimately a large proportion of CDS were traded by a small number of intermediaries, with each of them bearing a counterparty risk for the whole of the system. This concentration of risks was facilitated by the possibility for AAA-rated institutions to sell protection without being subject to collateralisation requirements, resulting in the creation of entities carrying considerable risks (AIG and all the monoline insurers) with a low entry cost. When the subprime crisis hit, a large number of these institutions were unable to meet their obligations (the mere downgrade of the department at AIG in charge of this activity resulted in too large a call for collateral), although there was not necessarily any material default.

Finally, although collateralisation could correct this effect, the asymmetry in CDS between payment of a fee and payment of the whole notional amount was not fully taken into account by market players, with the consequence that the capital levels required to hedge the positions of those selling protection were largely underestimated.

At the time of the subprime crisis and the Lehman Brothers bankruptcy, the various stakeholders considered it necessary to provide a certain number of responses to the malfunctions described above. Some of these measures have already taken effect.

¹ CDS, like interest rate or foreign exchange swaps, originally implied no entry cost: the CDS premium that was paid was calculated in such a way to make the actual value of the swap zero. There was therefore nothing to be paid, in principle, before the first premium payment. In practice, however, as these products were quite generally collateralised, the counterparties selling protection could demand an initial margin payment (in cash or in securities), although these costs remained low in relation to the financing cost of a bond

² At present, on the basis of the data published by the DTCC, the gross notional amounts outstanding on CDS contracts can be estimated to be about 15 times higher than the net amounts. At the height of the crisis, figures of as much as 200 times as estimates of this ratio have been observed.

1.2 Improvements made to the market since 2008

- **Improvements to market transparency: compression procedures, contract standardisation, confirmation**

In order to reduce gross notional amounts and bring them closer to the net amounts, so-called compression operations were organised extensively by the industry from 2008 onwards. The purpose of these operations was to transform a certain number of CDS buy-side and sell-side positions into a smaller number of economically-equivalent positions. The institutions taking part proposed positions for compression³ and the body handling compression calculated positions that could maintain an equivalent level of risk but for a smaller number of positions. Between the end of 2007 and the end of 2010, the gross notional amount outstanding of CDS was divided by two, partly thanks to these compression operations.⁴

To facilitate compression and clearing operations, CDS contracts were also standardised. Two main types of contracts were created: contracts for low-risk, investment-grade entities for which the amount of the coupon was set at 100 basis points⁵ (bp), and contracts for higher-risk, high-yield entities for which the amount of the coupon was set at 500 bp. When two counterparties trade a contract on an investment-grade reference entity for which they estimate that the real cost of the premium must be 250 bp, the difference between the standard contractual premium of 100bp and the "economic" premium will be paid on initiation of the contract: this is referred to as upfront payment. The protection buyer pays the discounted premium value of 150 bp of the notional amount which would be paid at the premium payment dates over the duration of the contract, and if the economic premium is below 100 bp it is the protection seller who pays this amount to the protection buyer. This facilitates compression operations (all contracts on a given entity have the same coupon) and also increases the cost of some speculative operations.

Finally, it can be noted that the great majority of transactions are now subject to electronic confirmation with the DTCC which makes a weekly publication of the volumes per reference entity and the gross and net notional amounts outstanding. This contributes to improving post-trade transparency on the market.

- **Generalisation of clearing houses and collateralisation**

According to the market players, about 60% of the European market and 75% of the American market now goes through clearing houses. ICE Europe is said to clear 98% of the European market (and LCH Clearnet, just 2%). In principle, 100% of the eligible operations⁶ executed between the members of ICE Europe are cleared (this was the commitment given by this group of the largest intermediaries who were the initial members of ICE Europe).

It can therefore be considered that clear progress has been made by increasingly extensive use of clearing. However, some market players (who were not initial members of ICE) say that they do not use clearing on the grounds that the cost would be prohibitive, although they do participate very actively in compression operations.

In addition to this, financial institutions collateralise the positions that have not been cleared via bilateral agreements with their counterparties. CDS are included in the same collateralisation agreements as all the other (interest and exchange rate) swaps; the exchanges of cash or securities for collateralisation are therefore made on the basis of the value of all of these products. It should be noted that incidentally, this can mean that a sovereign CDS is partly collateralised by sovereign securities if the latter are eligible as

³ Compression is carried out on a list of reference issuers defined at the outset.

⁴ The decline in the amounts outstanding is also linked to a lesser appetite for such products among certain market players

⁵ One basis point is equal to one hundredth of a percent, or 1/10 000th.

⁶ To be eligible, contracts must have at least a certain liquidity level. According to the ICE Europe website, ICE can handle clearing of 38 index CS contracts (CDS on a list of names) and 121 single-name CDS contracts (CDS on a single reference entity).

collateral. In practice, however, exchanges would appear to be mainly in cash and, in the case of major risk on a sovereign issuer, the bonds in question are generally no longer eligible as collateral.

However, valuation of less liquid CDS or of CDS on issuers that are close to default can be an issue for a clearing house or for market players with collateralisation agreements. The calculations of margin calls can become difficult in such cases, which can have an impact on the stability of the system. Therefore, although clearing and collateralisation have been generalised, fears as to their effective working in the event of default are not entirely removed.

- **Standardisation of default procedures**

Originally, in the event of default, the protection buyer was supposed to deliver the bonds to the protection seller in return for payment of the nominal amount of the CDS (physical settlement). However, as the protection buyer was not required to hold the bonds, cash settlement terms had to be defined.

In the bankruptcy of Lehman Brothers, a major player on the CDS market, fears emerged as to settlement of the default and unwinding of the contracts. Initially, compression was carried out to make a significant reduction to the amounts and contracts requiring effective settlement. After that, an auction system was set up and has been used since then. The principle is to fix the value of the bonds to be delivered by the protection buyers (referred to as the recovery rate and expressed as a percentage of par). The protection buyers who hold deliverable bonds can deliver them and be paid the full nominal amount of the swap. Protection buyers who do not hold the bonds or do not want to deliver them receive payment from the sellers of the nominal value of the swap minus the recovery rate. According to observers, thanks to the compression phase and the method applied to define the recovery rate, settlement of CDS on Lehman Brothers went rather well.⁷

Henceforth, in cases of default, the procedure mentioned above has become standard. It is preceded by two stages: first of all, a question is referred to an ISDA⁸ committee by one of its members: has there been a default event on entity XXX?⁹ Once it has received the question, the committee must give its response within 2 days. The following days are then spent defining the deliverable bonds (within no more than 10 business days). Once the deliverable bonds have been defined, auctions are held and settlement is generally within 30 calendar days of the question being referred to the committee, although it may take longer if determining the deliverable bonds proves complex.

In this auction system, there are differences between corporate and sovereign issuers. For corporates, when there is debt restructuring, the deliverable bonds are grouped together by maturity and recovery rates are defined for each maturity in the auctions (for example, bonds under 30 months, bonds between 30 months and 5 years, bonds between 5 and 10 years). This is not organised for sovereign issuer auctions, a fact which is currently having direct consequences on the prices of Greek bonds. In case of sovereign default, the same recovery rate would be applied to a bond with a 1-year maturity as to one maturing at 5 years; the result is that prices of these bonds on the markets are tending to converge, thereby explaining the very high rates on secondary markets for short-maturity Greek bonds¹⁰.

The various developments observed in recent times on the CDS market have considerably improved its functioning. Although the risks and uncertainties surrounding unwinding of contracts in the event of default or of difficulties encountered by a major player have been considerably eased, they have not disappeared altogether.

⁷ The precise details of the functioning of these auctions is very well described in *Le règlement des défauts sur le marché des Credit Default Swaps : le cas de Lehman Brothers*, Coudert and Gex in *Revue d'Economie Financière* n°97 (2- 2010).

⁸ There are several committees, each covering a geographical area. For Europe, the members of the Determinations Committee with voting rights are Bank of America / Merrill Lynch, Barclays, BNP Paribas, Credit Suisse, Deutsche Bank, Goldman Sachs, JPMorgan Chase, Morgan Stanley, Société Générale, UBS, BlackRock, BlueMountain, Citadel, D.E. Shaw Group and PIMCO. Voting is by an 80% majority. There are two members in an advisory role: Citibank and RBS.

⁹ A list of open questions and a credit events history can be found on the website http://www.isda.org/dc/credit_event_mgmt.asp

¹⁰ At first order, if a 6 months bond and a one year bond share the same coupon and the same price, then the 6 months bond actuarial rate is twice the one year bond actuarial rate.

2 ARBITRAGE POSSIBILITIES BETWEEN CDS AND BONDS

2.1 *The economic relationship between a CDS and a bond*

In theory, the purchase (or sale, respectively) of a CDS is economically equivalent to having a short (or long, respectively) position on the underlying bond (see box). According to the type of position being targeted, arbitrage positions between CDS and bonds therefore consist in:

- buying protection and buying the bond if we consider that the cost of protection is underestimated in relation to the spread on the bond;
- or selling protection and selling the bond if we consider that the cost of protection is too high in relation to the spread on the bond.

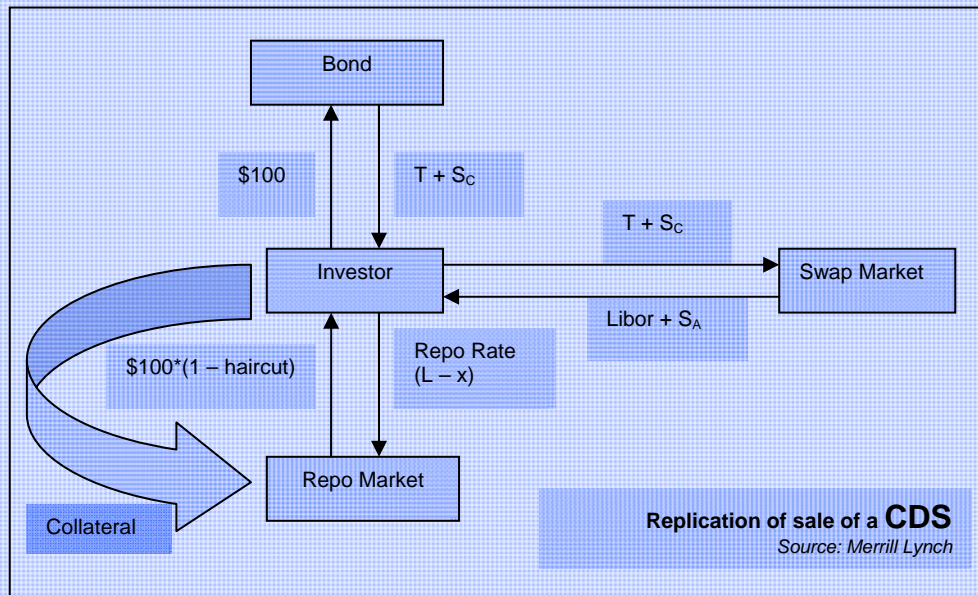
However, the first strategy implies financing the acquisition of the bond and therefore includes a liquidity cost (ease of access to the bond) and a financing cost. The second strategy implies borrowing the bond and therefore paying the related repo costs.

Liquidity costs and repo costs are parameters that can explain the reason for which spread levels between a CDS and a bond can be different. The difference between these spreads is called the basis.

Box: Replicating sale of a CDS by buying a bond and interbank operations

The following diagram shows how the sale of a CDS can be replicated, starting by purchase of a bond. This replication requires three parallel operations:

- **buying the bond** (*corporate asset*), for payment of the nominal value (\$100 in the diagram) and for which the investor receives in return risk-free rate T and a credit spread relating to the bond issuer S_c ;
- **financing this bond on the repo market**: the bond that has been bought is given to a counterparty as collateral in exchange for an amount in cash equal to the nominal value, possibly minus a percentage (*haircut*). Interest is paid by the investor on the loan of this amount of cash at the interbank rate (L for Libor), minus a percentage x because the operation is collateralised; in a repo operation, although the counterparty of the investor holds ownership rights to the collateral, the investor continues to receive the coupons;
- **hedging rate risks via an asset swap**: in order to avoid carrying any rate risks (which are not present in the CDS), the investor subscribes an interest rate swap in which he exchanges the coupons of the bond against a variable Libor interest payment plus a spread as remuneration for the risky proportion of the bond cash flows (asset swap spread S_A).



This strategy replicates the main features of a CDS in the absence of upfront payment. In the absence of a haircut on the bond, the cash flows, Libor interest and risk-free rate flows cancel each other out and the returns received by the investor are equal to $S_A + x$.

It is usual, in normal market conditions, to neglect the repo cost and to compare the CDS spreads and asset swap spreads directly.

This diagram shows the relative difficulty of replicating CDS flows and the possible frictions that can cause a negative or positive basis. In particular, any tension on interbank markets can result in an increase of repo costs (via rate x or the haircut) or more expensive swaps.

The different parameters that have an influence on the basis have the following effects:

- **Liquidity:** for corporate issuers, bond markets are generally less liquid than CDS markets.¹¹ This increases the cost of bonds and has a negative effect on the basis.
In contrast, on sovereign CDS markets, the basis is generally positive: the bond costs less than the protection. Sovereign bond markets are generally more liquid than CDS markets, which explains why the liquidity premium is in favour of bonds. Also, in tense market conditions, low-risk investments are preferred and this creates demand for the safest sovereign bonds. In this case, considerable distortion can be observed between CDS spreads and bond spreads.
In addition, the banks' management of their exposure can induce demand for protection and have a positive effect on the basis; a specific section is devoted to bank portfolio hedging activities. It would appear, however, that further to the decision by the ISDA by the end of October not to trigger CDS for Greek bonds despite a considerable haircut,¹² demand for protection has dropped and the positive effect on the basis has been reduced.¹³
- **Repo:** the repo operation has a positive impact on the basis (see box: the spread on the CDS is equal to the asset swap spread plus repo costs). In the event of strong demand for certain bonds, which can be the case for sovereign bonds, this impact is all the greater. For lesser-quality bonds, the effect can be negative, notably by introducing a haircut in the repo operation, as the bond cannot collateralise a loan for its nominal value.
- **Financing:** the asset swap spread (S_A in the diagram hereafter) depends on the general level of interbank liquidity: when there are strains on interbank markets, asset swap spreads widen and have a negative effect on the basis (and vice-versa).
The asset spread swap also depends on the investor, or more precisely on the investor's solvency. An investor considered as being low risk will have access to lower asset swap spreads than other investors. This means that arbitrage between the bond and CDS is less costly for a good-quality investor: the basis is not the same for everyone.
- **Counterparty risk:** the counterparty risk associated with CDS is also one of the explanatory factors and has a negative effect on the basis. The price of the CDS factors in the risk that the protection seller might not be able to honour payment of the protection. This effect is likely to make itself felt more strongly on sovereign CDS as protection buyers take account of the risk that the main dealers might be hit hard in the event of default by a State.
- **Technical factors:** Other factors can come into account in valuation differences between CDS and bond spreads, although they would seem to be of secondary importance at present when compared with those mentioned previously. Two such effects can be mentioned:
 - the CDS does not cover the accrued coupons of the bonds, which has a negative effect in principle on the basis;
 - CDS can be sold without access to capital markets, or even in the past without immobilising capital for non-regulated entities; the impact of this was strong supply of protection and therefore a negative effect on the basis; the generalisation of upfront payments and collateralisation agreements has probably diminished this effect considerably.

¹¹ The notional amount of CDS often exceeds the overall amount of bond issues for corporate issuers. Also, the great majority of CDS are subscribed with the same maturity whereas bond liquidity is divided between different issues with varying maturities.

¹² The ISDA considers that in the absence of an obligation to take part in the plan, the haircut does not apply to all investors and therefore does not constitute a credit event.

http://www2.isda.org/uploaded_files/tinymce/Update%20on%20Greek%20Q%20and%20A%2027%2010%2011.pdf

¹³ See p.17 below.

2.2 The difficulties of arbitrage

As indicated above, arbitrage strategies are based on repo and securities lending operations, either to finance acquisition of the securities or borrow them. These strategies are not without their risks in that they include a counterparty risk on the CDS and on the repo and swap operations required to obtain the bond and hedge interest rate risk.

In addition to this, this arbitrage is only supposed to generate the expected profit when they reach maturity or on default of the financed bond (the profit comes from the difference between the coupons of the bond and the premiums of the CDS). In principle, positive basis strategies consisting in selling the bond and CDS are more complex to implement as it is not as easy to borrow a bond over a long period of time within the framework of a repo operation than to finance purchase of the bond. In a turbulent market, as has been the case over the last three years, there is uncertainty as to the possibility of rolling the repo operations that allow this arbitrage while also keeping the financing terms unchanged.

This turbulent situation has also led to more frequent collateralisation agreements between counterparties. Through these agreements, the positions are marked to market daily and margin calls are issued to the debtor counterparty to reduce the exposure of the creditor counterparty. While this provides a way for arbitrageurs to record gains on their strategy before it reaches maturity, when the amounts of margin calls become too large, they can force the unwinding of positions before their maturity.

The large number of different parameters that can explain the value of the basis and uncertainties as to present and future market conditions therefore explain the difficulty for arbitrageurs to profit from apparent distortions between bond markets and CDS markets. In the particular case of sovereign issuers, certain market players consider that the occasional but massive interventions of the European Central Bank on the secondary market in the bonds of States that are “under threat” add an additional risk to strategies seeking to exploit a positive basis situation by selling CDS and the bond (strategies applied by investors who consider that the premium of the CDS is too high in relation to the spread on the bond).

3 IS THERE A CORRELATION BETWEEN CDS SPREADS AND BOND SPREADS?

Aside from the financial link between CDS and bonds and the possibility of arbitrage on their respective values, the question is raised of their relationship with each other as observed historically and the respective responsiveness of these markets.

3.1 The academic viewpoint

There have been a certain number of academic studies of the link between CDS spreads and bond spreads. They show that in the short term, differences between bond spreads and CDS spreads may occur and that these can be explained by different reaction times in the case of an event affecting the creditworthiness of an issuer. For corporate issuers, the CDS market is considered as being the one on which adjustments are made first. This is put down to greater liquidity on these markets and the fact it is easier to take up a position (notably a short position) via these instruments (Blanco, Brennan and Marsh, 2005), and by the action of informed players – banks – on these markets (Acharya and Johnson, 2007).

For sovereign bonds, there have been fewer studies and their results have been less conclusive. While Palladini and Portes (2011) came up with similar results to those of the studies on corporate issuers, Coudert and Gex (2010) and also Fontana and Scheicher (2010) showed that CDS lead the way on sovereign bonds with lower creditworthiness, while for less risky sovereign bonds, it is the bond market that responds the most quickly.

3.2 The market player viewpoint

In the interviews conducted with market operators, the following main points were highlighted:

- the possibilities for arbitrage between CDS and bonds on sovereign issuers are costly to implement (due to the upfront payment) and highly risky. Investors seeking to set up arbitrage strategies on Italy and France are said to have been forced to cut their positions when the basis moved in the opposite direction to the one they were expecting;¹⁴
- as in the academic research, market operators see no clear evidence of an immediate link in either direction between sovereign issuer CDS and bonds, and notably of any impact of CDS spreads on sovereign bond yield rates; they even add that any given crisis on the debt market can elicit different responses on the two markets. The recent case of Italy, or even of France (see the following section) where bond yields increased much more quickly than CDS spreads, perhaps mark a change of regime that might be a sign of the wariness of certain investors as regards sovereign CDS;
- the two markets (bonds and CDS) respond to different issues and are driven by different players:
 - sovereign bond markets are very deep, serve as a refuge in the case of some issuers, are supported by local dealers and also provide hedging for banks against interest rate risks (sovereign bonds or even futures contracts based on such bonds when they exist, are standard products to hedge or take positions on interest rate trends);
 - CDS markets are not nearly as deep on sovereign issuers: on France, net nominal amounts represent 2% of French debt and on Greece this ratio has never exceeded 10%. CDS provide hedging for global macroeconomic exposure to a country or the banking institutions of these countries and can reduce exposure to sovereign debt, notably for counterparty risk hedging desks.¹⁵ They are also used in exotic investment strategies consisting in betting on movements of the CDS premium in one direction or another (buying the CDS when betting on a rise, selling when betting on a fall or simply when convinced that the default risk is zero).
- CDS dealers never hedge their exposure to sovereign CDS directly on cash markets. When an investor asks a dealer for protection on Austria, for example, the dealer will begin by trying to hedge his position by buying protection on Austria from another operator. If this is not possible, hedging can be done by a CDS on Germany, for example (then possibly hedging the Germany/Austria spread via bonds), or even by a CDS index on Western Europe (a standardised, liquid product), with the trader then having to track the risk of his basis position between Austria and the index;
- risks of market manipulation on sovereign issuers would appear to be greater on CDS than on bonds, insofar as market transparency is poor and the action of a single player can have a significant impact given the relatively small volumes. These interventions are said to be risky, however, due to the costs they imply (a large initial payment as soon as CDS prices deviate from their contractual price; costs relating to collateralisation).

¹⁴ To profit from a CDS spread they deemed to be too high, these investors are said to have sold the protection and sold the bonds, hoping that the fall in the CDS spread would enable them to unwind their positions at a profit.

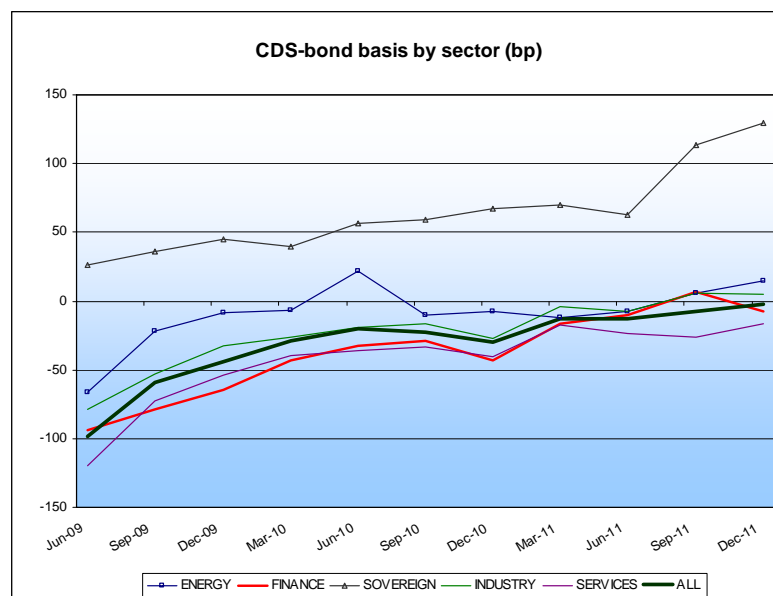
¹⁵ A specific section is dedicated to this activity, known as CVA: Credit Value Adjustment.

One operator stated very clearly that in the case of Germany, the recent trend in the CDS spread had had no effect on bond rates. For other countries, the situation is less clear-cut. Despite the arguments mentioned previously in favour of a weak influence between CDS spreads and bond prices, it can be imagined that investors might decide to sell the bonds they hold if tensions on the associated CDS spreads are too high, either by risk aversion or on account of a risk policy ruling out investment in securities for which credit spreads exceed a certain level. The application of such strategies could then result in a fall in the price of the bonds and a rise in the related bond spreads. One alternative might consist in buying CDS to hedge all or part of the positions, with the consequence being an increase in CDS spreads. According to the market operators, the different choices offered to investors translate implicit arbitrage by players: taking account of the costs of CDS and liquidity of secondary bond markets, investors choose one of these strategies, which causes prices on the two markets to converge.

3.3 Analysis of CDS and bond spreads

3.3.1 CDS bond basis comparison between sovereign issuers and corporates

The graph below shows the quarterly trend in the CDS-bond basis for a set of bonds serving as reference bonds for CDS.¹⁶ It shows that the basis is generally negative in most corporate sectors and positive for sovereign issuers. It should be noted, however, that since June 2009, the basis levels have narrowed for all corporate issuers, with median levels now being close to or slightly above zero. For sovereign issuers, the basis is systematically positive, with a widening trend at the end of 2011.

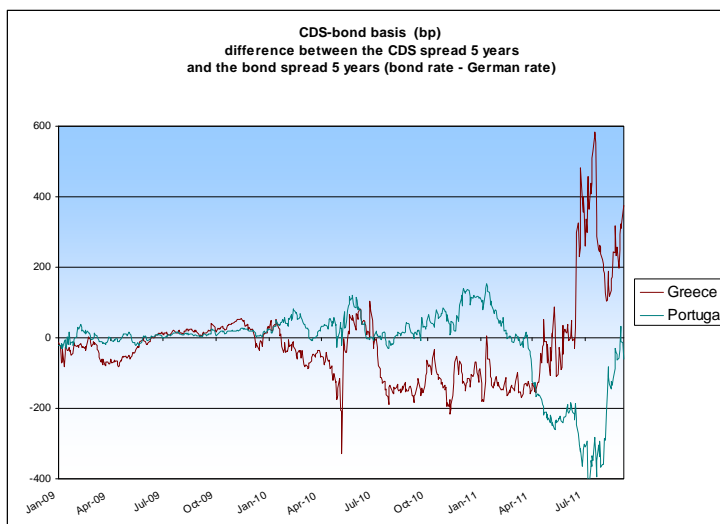


Source: Bloomberg

¹⁶ Median levels of the basis between CDS spread and asset swap spread for 725 corporate and sovereign bonds serving as a reference for the 600 most-traded CDS contracts in the US and in Europe (source Bloomberg)

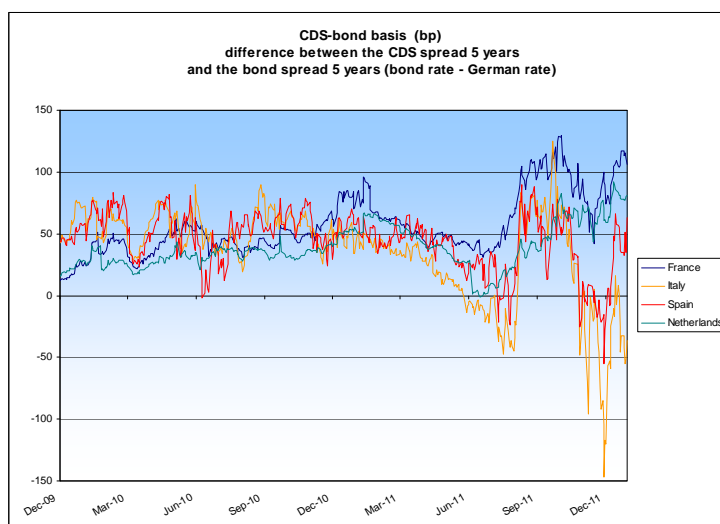
3.3.2 Basis trends for different Euro Zone sovereign issuers

As seen previously, in “normal” circumstances, the CDS spread on sovereign issuers is wider than the spread on their bonds. When their creditworthiness as perceived by the market deteriorates, the basis can change sign. The following graphs show the changes in the basis over the last two years for 6 Euro Zone countries: Greece, Portugal, Spain, Italy, France and the Netherlands.



Source: Bloomberg

Greece went through a long period during which the basis was negative, between July 2010 and May 2011. The CDS spread for Portugal has also been narrower than its equivalent for bonds since March 2011.



Source: Bloomberg

For France and the Netherlands, the basis remained positive over the two years, while that for Italy and Spain saw some negative spells in the course of summer 2011 and at the end of the year.

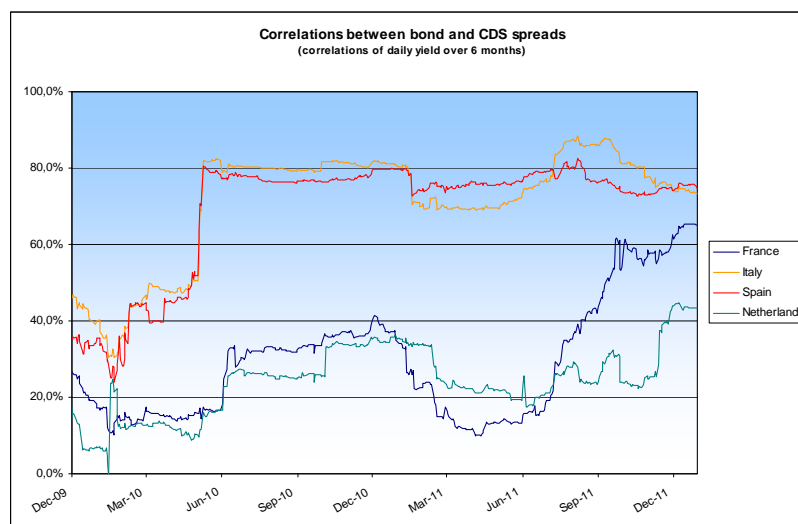
On the whole, there were three successive phases over the second half of 2011:

- in the summer, the basis widened for all the countries studied here. Between early August and early October, **CDS spreads widened markedly** (60bp for France, 100bp for Italy, 80bp for Spain and 50bp for the Netherlands) **whereas bond spreads remained stable**;
- in contrast, in October and November, basis levels fell clearly. This movement reflected **a larger rise in bond spreads than the rises in CDS spreads** and can no doubt be partly linked with the ISDA statement about the absence of a trigger for CDS with the aid plan for Greece. On France, for example, between October 4, the date when the basis reached its peak, and mid-November, bond spreads increased by 113bp and CDS spreads by only 34bp. For Italy over the same period, bond spreads increased by 200bp and CDS spreads by 105bp;
- finally, in December, basis levels returned close to those for October (except for Italy for which the basis increased and then fell back again). For France and the Netherlands, the rise in the basis was due to a marked fall in bond spreads while CD spreads remained stable. For Spain, CDS and bond spreads fell, although bond spreads fell more sharply. Conversely, for Italy, the large shifts in the basis were due to larger changes in the CDS spread than in the bond spread.

In the space of a few months, there were therefore three sharply contrasting phases as regards spread levels, with differences between the different Euro Zone countries. This confirms the difficulty observed by market operators and the academic world in identifying the market (CDS or bonds) which has the greater influence on the level of the basis.

3.3.3 Correlation between bond spreads and CDS spreads

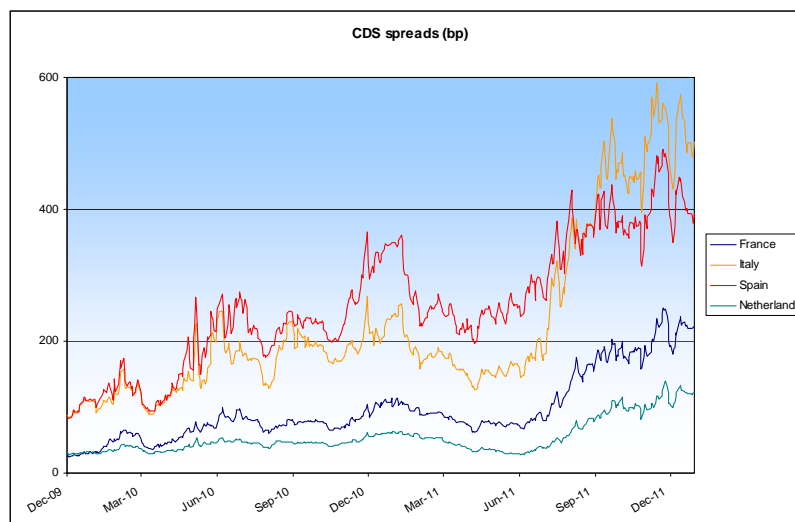
The following graph shows the trend in correlations between bond and CDS spreads over the last year for four countries in the Euro Zone (France, Italy, Spain and the Netherlands).



Source: Bloomberg

There are notable differences between Italy and Spain on the one hand, and France and the Netherlands on the other. For the former, the correlation between spreads on CDS and on bonds has been very clear (around 80%) since May 2010. For the Netherlands, however, this correlation has always been weak and has never exceeded 45%. For France, correlations were rather weak for a long time and only increased recently.

The correlation levels should be compared with the CDS spread levels of each of these sovereign issuers. In May 2010, the CDS spreads of Italy and Spain went over the 200 bp mark and since then they have remained almost constantly above that level. The 200bp threshold was crossed by France on 22 September 2011, the date when correlations were at their highest.



Source: Bloomberg

This suggests that there are two different regimes according to CDS spread level. Below 200bp, the trend in sovereign CDS spread levels shows little correlation with bond spreads. Above this level, a correlation appears. In other words, as long as default risk and the sovereign crisis seem to be contained, bonds play their role as a refuge and rate spreads and CDS spreads are not correlated. However, when sovereign risk grows sharply, bonds lose their refuge function and a correlation appears: bond and CDS spreads then evolve together.¹⁷

4 PRICE SETTING ON THE CDS MARKET

CDS spreads play a particularly important role in the perception investors can have of the risk associated with a given issuer. In the light of this role, the terms on which prices are set and their disclosure to the market are essential. In this respect, the transparency of the CDS market and its concentration raise questions.

4.1 The CDS market remains concentrated and lacking in transparency

In April 2011, the European Commission opened competition inquiries into the functioning of the CDS market:

- the first concerned sixteen banks and the Markit data service. They were suspected of restrictive practices or abuse of a dominant position seeking to limit access to price data for Markit's competitors. The methodology used by Markit to publish its CDS spreads daily is not public;

¹⁷ In an article by the AGEFI on 1st December 2011, a credit strategist made the same remark. "There is a close correlation once debt problems have been identified, as in the case of Greece, Portugal and Ireland. More recently, rate spreads and CDS spreads have been correlated in the cases of Italy or Spain. However, until recently, we could not detect any link for the core Euro Zone countries [...]. That has been less true since tensions have appeared on these countries. I conclude from this that as long as a sovereign bond holds the role of a refuge, there is no correlation. Once that status is brought into question, the CDS follows the same trends as the yield."

- the second concerned agreements between nine of the sixteen banks and ICE Clear Europe. These agreements contained clauses on preferential commissions or profit-sharing agreements. Such clauses could be an incentive for these banks to use ICE Clear only, thereby restricting the activity of the other clearing houses or removing any possibility for any other CDS market intermediary to use a clearing house other than ICE.¹⁸ This again raises questions on the links between the main operators on the market and post-trade players and on the concentration of the market.

Calculations using DTCC data show that when we think in terms of net notional amounts outstanding, the number of participants with an influence on the market is quite large. This result modifies slightly the usual view that this is an ultra-concentrated market. However, if we think in terms of gross amounts or the number of contracts, the CDS market remains highly concentrated despite regular compression operations. In particular, on CDS on France, the five main players are one of the counterparties (or both) in 80% of CDS contracts and the top ten players are one of the counterparties in 97% of contracts. Also, from a sector point of view, the market seems more concentrated on non-financial enterprises than for the banking and sovereign sectors.

The existing data on the CDS market, and notably data from the DTCC, provides a precise view of the main exposure of the operators. It does not, however, provide much of an insight into the price formation mechanism. The CDS market thus continues to suffer from a lack of transparency:

- *pre-trade* transparency is poor: as trades are OTC, access to the prices of the different market makers is via interbroker dealers (IDB), broadcasters (such as Bloomberg) or sending directly to clients; in principle, there is no simple way for an investor to know the real state of supply, demand and the spreads proposed by all the different players at a given moment, although there are some initiatives being developed;¹⁹
- despite the access regulators have to the data of the DTCC, post-trade transparency also remains limited. The available information cannot provide a precise idea of the intraday price ranges practiced by investors nor an indication of the pertinence of the spreads published by Markit at the end of the day.

CDS markets are very different from stock markets, notably because the average size of transactions is not comparable. Therefore, similar transparency to that on regulated stock markets is not necessarily possible or even desirable. However, at present there is not enough evidence to judge the real impact on the prices of the transactions that are executed, the spreads practiced in the course of the day and the consistency between the published prices and actual prices in contracts. If the number and volume of transactions on sovereign issuers indicate that these are the issuers for whom the market has been the most active recently, the effective functioning of the market and the possible existence of price manipulation remain difficult to assess.

4.2 Bid-ask spread trends for CDS and bonds (France and Germany)

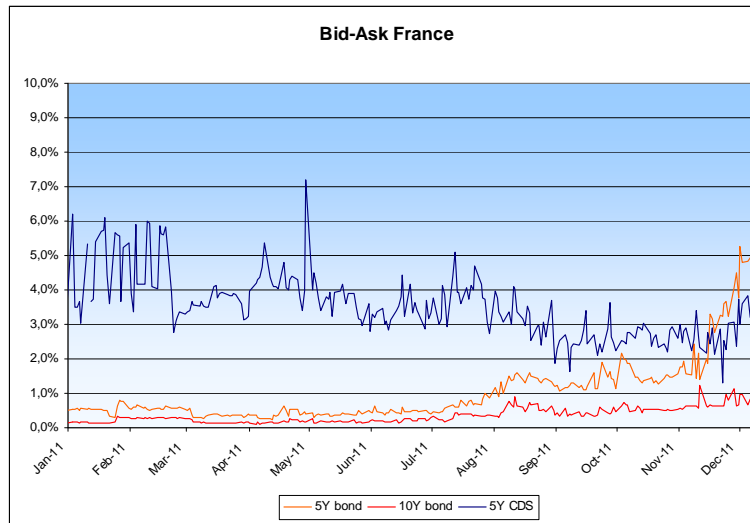
In the absence of available data on the details of transactions, it is still possible to obtain data on the size of bid-ask spreads (the difference between bid prices and ask prices, source Bloomberg). By comparing trends in these spreads on France and Germany, a certain number of conclusions can be drawn. This is presented in the graphs hereafter.

It can be observed that in the image of prices, the bid-ask spread for France has seen some significant changes since summer 2011. The size of the spreads on CDS narrowed quite markedly when the size of bond spreads increased (a little on 10-year bonds and more noticeably on 5-year maturities). On the five-

¹⁸<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/509&format=HTML&aged=0&language=FR&guiLanguage=fr>

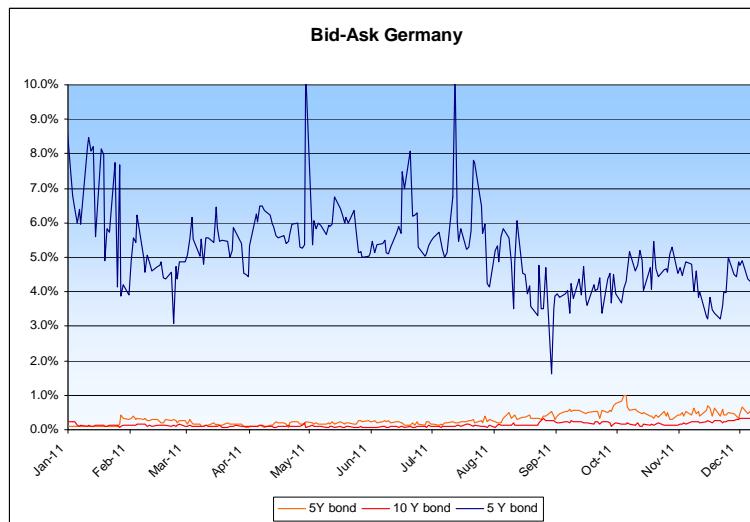
¹⁹ A group of 13 investment banks recently announced an initiative aiming to develop pre-trade transparency on electronic CDS trading platforms (in the US at first, in principle).

year bond market, which is admittedly less liquid than the 10-year market that remains the reference maturity, the size of the spreads even widened beyond those on CDS recently.



Source: Bloomberg

For Germany, a similar fall in CDS spreads is notable over the same period (the spreads remain greater than on the CDS France, reflecting the fact there was less activity). While bond spreads also increased, especially on five-year bonds, the rise remained limited and the spread levels a long way from those on CDS.



Source: Bloomberg

Also, whether for France or Germany, the difference in the spread sizes between the most liquid products on bonds (10-year maturity) and on CDS (5-year maturity) is an additional indicator of the differences in liquidity between the two markets on sovereign issuers.

5 SOVEREIGN CDS: PARTICULAR ISSUES

5.1 A discontinuity zone close to default

The improvements made in the wake of the Lehman Brothers default reassured players as to the functioning of the CDS market, even in the case of a major default:

- the generalisation of operation collateralisation allows protection buyers to benefit from hedging as soon as spreads deteriorate and to reduce their counterparty risk (if the protection seller should ultimately prove to be unable to pay the insured nominal amount);
- standardisation of contracts and of the default procedure improves handling of a default event, even a major one.

However, in the case of uncertainty on an issuer, daily variations in CDS spreads can be large. Collateralisation agreements in this case can sometimes imply high margin calls at times when access to liquidities is difficult. If the collateralisation agreements reduce counterparty risk by revising position values daily, they do not eliminate the risk entirely, especially as the clauses of the contracts are sometimes not known. As an example, for a net sell-side position of one billion dollars²⁰ at 5 years (standard duration for CDS), an upwards variation of one basis point in the spread on France implies a fall in the value of the position by around €480,000.²¹ A brutal variation in these spreads could therefore give rise to very large daily calls for margin.

It thus appears that although the CDS market has distinctly improved the way it functions since 2008, there remain uncertainties when an issuer, notably a sovereign one, comes close to a payment default.

5.2 The important and growing role of CVA desks

Since 2006, the FASB 157 and IAS 39 banking standards have required that banks record counterparty risk in the P&L of their positions. Two similar positions with counterparties of different risk levels are posted differently by credit value adjustment, CVA. This value adjustment, which can be carried out in different ways is largely applied by the Anglo-Saxon banks using implicit default probabilities taken from CDS spreads. This accounting practice is consistent for the banks which use CDS to hedge their positions, thereby justifying their use in the calculation of the CVA. In the subprime crisis, CDS spreads increased sharply on all issuers and the CVA were an important factor in the losses recorded by the financial institutions. This led the Basel Committee to include a specific capital charge in Basel III to hedge this risk of a loss linked to CVA (application scheduled for 1st January 2013). This charge is based, as is usual practice in the Anglo-Saxon countries, on the CDS spreads (even for those institutions that might calculate their CVA by other methods, for example by using historic default probabilities). The additional cost induced by this capital charge has already had several consequences:

- the generalisation of collateralisation contracts on derivatives positions via calls for margin; this trend, which is a way of limiting counterparty risk, is not simply due to the additional capital charge linked to CVA but the introduction of this new charge will enhance the interest of such contracts;
- the creation within the investment banks of dedicated desks for managing CVA risk, taking positions on CDS markets in order to reduce the largest CVA.

²⁰ For the most-traded names, notably sovereign issuers, positions of this scale and greater are taken by certain market operators.

²¹ About €4.8 for each €10,000 insured nominal amount, taking the assumption of a France CDS spread equal to 200 basis points and a flat risk-free rate curve through to 5 years equal to 2%.

In the case of an issuer with a spreads curve at 500 basis points and a risk-free rate curve at 4%, the value of a position at 5 years varies by €4 for every €10,000 insured.

Market players indicated that CVA desks are particularly active on the sovereign CDS market, on the one hand because exposure of the banks to these issuers is large and on the other because sovereign issuers do not sign bilateral collateralisation agreements with financial institutions.²²

By using CDS spreads to define a regulatory capital charge, Basel III runs the risk of increasing the size of that market, both in the use of its prices and in its use as a hedging tool. It is possible that this effect may be all the greater on sovereign issuers and that it may continue to create strong demand for CDS on these issuers.²³ It is also possible that this effect might be procyclical, amplifying demand when spreads widen.

This has been acknowledged by the European Commission and exemptions of capital requirements for CVA risk may be introduced for some non financial corporates (the exact range remains to be precised), in the Capital Requirements Directive IV.

In addition to this, the significant capital requirements associated with CVA also aims to encourage operators to develop the signing of bilateral netting agreements and central clearing (transactions with a central counterparty are excluded from the own fund requirements for CVA risks)

²² When such agreements exist, they only result in payment of collateral from the bank to the sovereign issuer but not in the other direction, subject to two exceptions in Europe: Portugal and Ireland.

²³ See the title of an article in risk.net on 2 November 2011: *CVA desks to keep buying sovereign CDSs – even if they never pay out* <http://www.risk.net/risk-magazine/news/2121414/cva-desks-buying-sovereign-cdss-pay>

BIBLIOGRAPHY

On the CDS market in general

Chen K., M. Fleming, J. Jackson, A. Li and A. Sarkar *An analysis of CDS transactions: implications for public reporting*, September 2011

http://www.newyorkfed.org/research/staff_reports/sr517.pdf

Cont R. *CDS et stabilité financière*, July 2010

<http://www.banque-france.fr/fr/publications/revues/revue-stabilite-financiere/htm/revue-stabilite-financiere-de-juillet-2010.asp?espace=null&interet=null>

Das S. *Les CDS – innovation financière ou dysfonctionnement financier ?* July 2010

<http://www.banque-france.fr/fr/publications/revues/revue-stabilite-financiere/htm/revue-stabilite-financiere-de-juillet-2010.asp?espace=null&interet=null>

Markit *The CDS Big Bang*

http://www.markit.com/cds/announcements/resource/cds_big_bang.pdf

Olléon-Assouan E. *Techniques de marché des dérivés de crédit : les swaps de défaut (CDS)*, June 2004

http://www.banque-france.fr/archipel/publications/bdf_rsf/etudes_bdf_rsf/bdf_rsf_04_etu_3.pdf

On the functioning or credit event auctions

Coudert V. and M. Gex, *Le règlement des défauts sur le marché des Credit Default Swaps : le cas de Lehman Brothers*

On the links between CDS and bonds

Acharya V. and T. Johnson (2007): Insider trading in credit derivatives, *Journal of financial Economics*

Amadei L., S. Di Rocco et al. (2011): *CDS, Contract characteristics and interrelations with the bond market*.

http://www.consob.it/documenti/Pubblicazioni/Discussion_papers/dp1en.pdf

Arce O., S. Mayordomo, J.I. Peña *Do Sovereign CDS and Bond Markets Share the Same Information to Price Credit Risk? An Empirical Application to the European Monetary Union Case*. June 2011

http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1896297

Blanco, R., S. Brennan and I. Marsch (2005): An empirical analysis of the dynamic relation between investment grade bonds and credit default swap, *Journal of finance*

Coudert V. and M. Gex, *Marché des CDS et marché obligataire : qui dirige l'autre ?* July 2010

<http://www.banque-france.fr/fr/publications/revues/revue-stabilite-financiere/htm/revue-stabilite-financiere-de-juillet-2010.asp?espace=null&interet=null>

Coudert V. and M. Gex, *The interactions between the CDS and the Bond market in financial turmoil*. February 2011

<http://www.cepii.fr/anglaisgraph/workpap/pdf/2011/wp2011-02.pdf>

Fontana A. and M. Scheicher *An analysis of Euro Sovereign CDS and their relation with government bonds*, WP de la BCE December 2010,

<http://www.ecb.int/pub/pdf/scpwps/ecbwp1271.pdf>

On the consequences of a Greek default on the CDS market

Finger C. *Greece, Contagion and Credit derivatives*, MSCI Research Bulletin, July 2011

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