II.3. The euro-area sovereign CDS market

The sovereign debt crisis is now in its third year. Already at an early stage of the crisis, concerns were raised about the possibly aggravating role of the market for credit default swaps (CDS). This special topic attempts to provide a broad and accessible view of developments in the sovereign CDS market. It also discusses some critical issues related to the CDS market.

CDS and their use

Credit default swaps are financial instruments that allow credit risk to be taken or transferred from one party to another. (38) Credit risk arises from the possibility of default on a pre-agreed payment, and the purchase of a CDS contract pays off when such a payment default occurs, thereby shifting the risk to the seller of the CDS. CDS markets are therefore important vehicles for reallocating risks on financial markets.

Sovereign CDS can be used for many different purposes. For example, they can be used to hedge an existing government bond position, or other exposures with a high sovereign correlation (‘proxy hedging’), against losses from potential deterioration of the creditworthiness of the borrower. They can also be used to take an exposure to sovereign risk and receive a return in exchange for the credit risk assumed, or be used as trading tools for exploiting arbitrage opportunities in government bond markets. Other fields of application are portfolio and regulatory capital management. In addition, sovereign CDS are a standardised instrument for studying and comparing credit risk across countries.

The general terms of a CDS contract are laid down in standard documents, most often as proposed by the International Swaps and Derivatives Association (ISDA). For such contracts, the ISDA Credit Derivative Determination Committee determines whether a credit event (39) has occurred. The Committee has to reach a qualified majority of 80% to resolve a Credit Event Request Resolution (a request for determining whether a credit event has occurred). The Determination Committee consists of market participants termed ‘voting dealers’ (10), ‘consultative dealers’ (2), and ‘voting non-dealers’ (5).

In the event of a default, an investor who has bought a CDS contract is entitled to receive a payment equivalent to the face value of the bond, less any amount recovered from the bond obligation. There are two ways of settling a CDS contract in the event of default. One involves the physical delivery of bonds in exchange for money and is termed physical settlement. The other involves only the transfer of cash and is called cash settlement. (40)

Following the exercise by Greece of collective action clauses to amend the terms of Greek government bonds, the Determination Committee unanimously resolved that a restructuring credit event occurred on 9 March 2012. The second financial assistance programme for Greece included a condition regarding private sector involvement that would allow Greece to bring its debt level down to a sustainable level. The exchange of old bond holdings for new bonds at a lower value was initially voluntary. Creditors holding more than 85% of the value of Greek bonds participated. However, to increase participation, Greece introduced and then triggered collective action clauses. As a result, this constituted a credit event.

CDS position trends

Since the beginning of 2009, the gross notional value for CDS contracts written for euro-area Member States has been trending upward. Notional values represent the par amount of credit protection bought or sold, and gross notional values are the sum of CDS contracts bought or

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(38) Credit default swaps are over-the-counter (OTC) products and are quoted in basis points per year — the so-called CDS spread. The CDS spread indicates the cost per year to either buy or sell exposure to the possibility of default or restructuring of an underlying debt security. Thus, a buyer of a CDS contract incurs a yearly cost, an ‘insurance’ premium to be paid, to hold the contract.

(39) A sovereign CDS contract can be triggered when a credit event occurs. There are basically three credit events for sovereign CDS:

1. Failure to pay — a sovereign fails to make a payment under one or more obligations, where a grace period for payment is taken into account.
2. Restructuring — a sovereign changes the terms of the relevant obligation, which makes it less favourable to the holders. These events include a reduction in the principal amount or interest payable, a postponement of payment, and a change in ranking in priority of payment.
3. Repudiation/moratorium — a sovereign refuses to honour its obligations and declares a moratorium and acts accordingly. This particular credit event will only trigger payment under the CDS contract if it is accompanied by an actual failure to pay or by a restructuring.

(40) In case of a major credit event that is followed by an auction all contracts tend to be cash settled.
equivalently sold. (41) The number of contracts has increased in parallel (see Graph II.3.1). Both indicators provide information on the activity taking place. However, the gross notional value overstates the level of new activity because it represents a cumulative total of past transactions, many of which were used by dealers to make their daily adjustments to their risk positions. Furthermore, they do not represent an overall measure of the exposures involved.

Both types of trade have added to the gross notional value and the number of outstanding contracts but net exposures have remained broadly stable. The sharp drops that occur at specific dates in the gross notional value and the number of contracts are due to trade compression, i.e. in order to reduce counterparty risks, the trade repository Depository Trust and Clearing Corporation (DTCC) organises bilateral and multilateral tear-ups (see footnote 41).

Trading in Member States’ CDS and the increasing number of contracts has produced no effect on overall exposures. Market participants may enter into new transactions both for assuming new exposures and for closing old positions. The main way for market participants to close a position is for one party to enter into an offsetting transaction, which leaves the original transaction in place, but effectively cancels out its economic effect. (42) Both types of trade have added to the gross notional value and the number of outstanding contracts but net exposures have remained broadly stable. The sharp drops that occur at specific dates in the gross notional value and the number of contracts are due to trade compression, i.e. in order to reduce counterparty risks, the trade repository Depository Trust and Clearing Corporation (DTCC) organises bilateral and multilateral tear-ups (see footnote 41).

The aggregate figures hide differences among Member States. Trading in CDS and the increasing number of contracts for the programme countries Greece, Ireland and Portugal has mainly reduced CDS exposures towards these countries in recent years. The net notional values in CDS for the programme countries Greece, Ireland and Portugal have declined by between 35% and 62% since February 2010. Also, the net notional value in Italian CDS has declined by almost 30% since December 2010. The decline in the net notional position in conjunction with the increase in the gross notional position and the number of contracts imply that new contracts have been traded in order to close out old positions. For

(41) In a market with three parties trading CDS contracts of the same reference entity, i.e. the same country, A has sold protection for EUR 100 million and bought protection for EUR 200 million; B has sold EUR 200 million and bought EUR 200 million; and C has only bought EUR 50 million. The gross notional amount is then the sum of outstanding amounts (either sold or bought), which is EUR 300 million. The net notional amount is the sum of the individual net positions, where A has sold a net amount of protection of EUR 50 million, B has a zero net position, and C has bought a net amount of EUR 50 million. The net notional amount is then the sum of outstanding net positions (either sold or bought), which is EUR 50 million.

(42) There are two other ways to close a position: (i) the parties can agree to a termination (or tear-up), under which they agree to extinguish the original obligation following payment, or (ii) a party can enter into a novation, also known as an assignment, under which it transfers its rights and obligations under the transaction to a third party in exchange for a payment.
other Member States, e.g. France, Germany, Spain and the UK, trading has implied that market participants have increased their direct exposures via CDS contracts. However, it is impossible to say whether these CDS positions are used for hedging purposes or are of a speculative nature.

Market participants’ total net exposures towards 16 euro-area Member States’ CDS (all except Luxembourg) are in general small. More than two thirds of all net exposures lie in the interval EUR -100 to +100 million (a minus sign means that the institution is a net seller of protection, see Graph II.3.5). In the dataset, the biggest net protection buyer has a total position of around EUR 8 billion and the biggest net protection seller a position of EUR 12 billion. Besides a few major investment funds, the institutions with the largest net exposures are among the biggest banks in the world and act as market makers in CDS contracts. The median net protection buyer (the median of all positive exposures in the distribution, the right tail) and the median net protection seller (the median of all negative exposures, the left tail) have positions of EUR 36 and 58 million respectively. In relation to the total face value of outstanding sovereign debt (about EUR 7 800 billion), these net exposures are very small.

CDS exposures

The following analysis is based on non–public information from summer 2011. The data supplied contain both detailed and aggregate information on individual firms’ positions in euro-area sovereign CDS. The data provide an instantaneous picture of the stock of all positions and exposures at the time of the request. Although the data are outdated, they provide interesting information on the holdings of CDS.

Graph II.3.3: Outstanding credit protection for individual Member States — gross notional amounts (billion euros)

Source: Commission services

Graph II.3.4: Outstanding credit protection for individual Member States — net notional amount (billion euros)

Source: Commission services
The dealers in the tails of the distribution are some of the biggest banks in the world, acting as market makers in CDS. These institutions act on both sides of the market and have large amounts of both bought and sold contracts. Their biggest individual exposures are in general vis-à-vis other dealers. It is likely — but not certain — that these exposures represent offsetting deals in order to manage market and counterparty risks. Moreover, the net exposures that CDS represent in terms of total assets managed by these firms are tiny.

Alongside the dealers, a set of (hedge) funds take active positions in CDS. These firms hold relatively few contracts and mainly take one-sided bets, although there are firms on both sides of the market — protection buyers and protection sellers. It is not possible to say whether these positions are ‘speculative’ or serve another purpose. Without data on the holdings of each fund, it is impossible to indicate the purpose of these CDS positions. Besides being purely speculative, the CDS positions may be held for hedging purposes, e.g. reducing single exposures to sovereign or corporate bonds. They may also serve as instruments in more complex, maybe even dynamic, investment strategies targeting risks other than sovereign risk. CDS contracts may also have been used to exploit arbitrage opportunities.

Consistent pricing, rating and absence of arbitrage

A first consistency test of the CDS market is to compare the theoretical implied prices with the ones established on the market. As a default swap is a derivative product, its price can be theoretically derived through a no-arbitrage argument under the assumption that markets are connected without frictions. It is possible to derive several different arbitrage conditions, i.e. different pricing formulas. For example, the yield to maturity minus the risk-free yield constitutes an upper bound for the CDS spread. (\(^{33}\))

To avoid having to decide what risk-free rate to use, the arbitrage condition can be specified relative to another country. In Graph II.3.6, CDS spreads and the bond yields for the five-year maturity are plotted for 11 euro-area Member States relative to German spreads and yields. The 45-degree line constitutes the upper bound for what the CDS spread should be. As long as the points are below the 45-degree line there is no evidence of any obvious mispricing. However, this representation of the market does not rule out the possibility of prices being manipulated; it just suggests that prices are contained within the theoretical bounds.

Graph II.3.6: Five-year CDS spreads and five-year benchmark bond yields relative to Germany (averages Jan. 2010–Dec. 2011)

The CDS spreads are within or very close to the no-arbitrage bounds. The spreads and the yields are calculated as averages over a period stretching from the beginning of 2010 to the end of 2011. Thus the chart gives a medium-term perspective of the relationship. Overall, the picture is not changed by altering this time period. Regarding Member States that are not subject to acute financial stress, only France lies above the 45-degree line by a few basis points, which is too costly to exploit. A divergence from the arbitrage bound can be explained by recognising that Germany is not necessarily the best benchmark to substitute for the risk-free rate. In this case some countries could end up above the 45-degree line.

Graph II.3.6 also shows that CDS spreads for the more troubled countries are relatively cheap compared to the bond spreads. This is a first

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\(^{33}\) By forming a portfolio of a bond and the credit default swap for the same entity, an investor can eliminate most of the risks associated with default on the bond. Approximately, if \(y\) is the yield to maturity on the bond and \(s\) is the CDS spread, the net annual return on the portfolio is \(y-s\), i.e. the yield minus the hedging cost. In the absence of arbitrage opportunities, this should be approximately equal to the risk-free yield, \(rf\). The CDS spread \(s\) can thus be estimated to be equal to \(y-rf\). To reach this conclusion, several simplifying assumptions have to be made, e.g. that the recovery rate of a defaulted bond is zero. A proper valuation of the CDS spread requires an estimate of the risk-neutral probability that the underlying bond will default at different future times and an estimate of the expected recovery rate in the event of default.

The simple case, where \(s = y-rf\), is an approximation of the true spread and constitutes an upper bound for the spread, thus the relationship does not hold with equality. Another example of an arbitrage condition is what is termed the CDS-bond basis, which is the difference between the yield and the asset swap spread.
indication that CDS spreads cannot be considered as causing the high bond yields for these countries, which was a concern at the onset of the sovereign debt crisis. This finding is consistent with sufficient supply of hedging being offered for troubled countries and speculators acting as hedging (liquidity) providers at a time of distress. This could be considered to be beneficial for the cost of funding sovereign deficits, because the hedging provided allows institutional investors to take on more debt, and thus keeps the yields for troubled countries lower than would otherwise be possible. From this perspective the CDS market seems to facilitate risk sharing.

Market linkages, price discovery, and market microstructure

The Commission has previously studied several other issues concerning sovereign CDS and bond markets, e.g. market linkages, price discovery, and market microstructure. Sometimes the approach has been broad and in other cases the focus has been narrower, e.g. on one Member State or a particular sector. The following is a summary of selected findings.

Market linkages. To explore the links between the CDS and the bond market one can analyse the cross-correlations between changes in the CDS spread and changes in the asset-swap spread. \(^{(44)}\) These correlations show that the two markets are moving close together. The vast majority of countries show no lead or lag behaviour, and when the series are not changing contemporaneously, CDS and bond markets are basically equally likely to lead or lag the other.

Price discovery. Analysis based on Greek data shows that credit risk price discovery also seems to occur on both markets simultaneously. One of the most important functions of financial markets is price discovery, which is the process whereby buyers and sellers arrive at a transaction price. Because buyers and sellers discover prices on the basis of uncertain expectations, transaction prices fluctuate around the ‘true’ market price. Both the bond and the CDS markets price credit risk equally on average, as demonstrated by the stationary CDS-bond basis. This long-term relationship justifies the use of a vector error correction model when analysing the interconnection between the two markets. \(^{(45)}\) The

Graph II.3.7: Average CDS spreads in 2011Q4 for individual Member States according to credit rating

<table>
<thead>
<tr>
<th>Rating</th>
<th>Basis points</th>
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<tr>
<td>AAA</td>
<td>1200</td>
</tr>
<tr>
<td>AA</td>
<td>1000</td>
</tr>
<tr>
<td>A</td>
<td>800</td>
</tr>
<tr>
<td>BBB</td>
<td>600</td>
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<tr>
<td>BB</td>
<td>400</td>
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<td>B</td>
<td>200</td>
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Source: Bloomberg and Ecowin

In general, CDS spreads are clustered and aligned according to the entities’ rating (see Graph II.3.7), i.e. participants on the CDS market and credit rating agencies form consistent opinions concerning Member States’ credit risk. In fact, the CDS spreads and ratings are very consistent with each other. The distribution for each rating category becomes wider as creditworthiness falls, implying that Member States with a higher credit rating are more homogenous in their economic performance than Member States in lower rating categories. For the lower rating categories the distribution of CDS spreads overlap somewhat, indicating that there is some ambiguity concerning which rating category some Member States should be in.


\[ \lambda_2 \] would be negative and statistically significant as the CDS market adjusts to incorporate this information. Similarly, if the CDS market is an important venue for price discovery, then \( \hat{\lambda}_j \) will be

\( \Delta_{t \rightarrow t+1} \) is the difference between the CDS and LIBOR rate, expressed in basis points. The asset-swap spread is designed to show the credit risk associated with the bond. The difference between the CDS and the asset-swap spreads is another arbitrage condition called the CDS-bond basis. In principle the basis should be zero.

\( \Delta_{t \rightarrow t+1} \) A formal test of the equivalence of the price of credit risk across the CDS and the bond market can be motivated in terms of transitory and permanent price movements. If the two markets price credit risk equally in the long run, their prices should be cointegrated, suggesting a stationary basis. The CDS price and the asset swap spread for Greece are cointegrated \( l(1) \) variables and the common factor can be viewed as the implicit efficient price of credit risk. To see which of the two markets contributes most to the credit risk price discovery process, it is necessary first to estimate the following vector error correction model:

\[
\Delta p_{CDS,t+1} = \lambda_1 \sum_{j=1}^{2} \beta_j \Delta p_{CDS,t-j} + \sum_{j=1}^{2} \delta_j \Delta p_{ASW,t-j} + \epsilon_{t+j} \\
\Delta p_{ASW,t+1} = \lambda_2 \sum_{j=1}^{2} \beta_j \Delta p_{CDS,t-j} + \sum_{j=1}^{2} \delta_j \Delta p_{ASW,t-j} + \epsilon_{t+j}
\]

If the bond market is contributing significantly to the discovery of the price of credit risk, then \( \lambda_2 \) will be
model estimation shows that price discovery occurs simultaneously on the two markets. However, during the period studied — 1 January 2007 to 19 October 2010 — the coefficients suggest that about 70% of price discovery occurred on the CDS market. This is consistent with anecdotal evidence, which says that it is easier and cheaper to trade and express views on credit risk on the CDS than on the bond market.

**Market microstructure.** The market microstructure concerns the process and outcomes of exchanging assets or contracts and how the equilibrium prices are reached. In terms of efficiency the key concepts are liquidity, volatility and transparency.

Although the notional amount outstanding is large, liquidity on the sovereign CDS market cannot be considered fully adequate. The liquidity of the market seems to differ depending on the contract being traded, where liquidity in most contracts seems to be reasonably good, especially for the larger Member States, but others are less liquid. This follows from two observations. First, the immediacy of the market — how fast a market participant can execute its trading decision and find a counterpart for the trade — should be relatively low. As the market is OTC, the trading process involves a situation where a buyer tries to find the seller with the lowest price, and this takes time. Finally, the depth of the market — how much a market participant can buy or sell without changing the price — seems to be fine, but depends on the Member State considered. In general, transactions are made on a daily basis for many Member States, but for some there are holes in the time series, an indication of low depth.

Volatility was generally low prior to the financial crisis, after which it picked up. Still, the average standard deviation across all Member States’ CDS spreads is contained at around 35 basis points (excl. Greece), which is much lower than for bank CDS. There are, however, large differences between default swaps for individual Member States. In general, the volatility of the CDS market seems to show some efficiency.

Finally, transparency can be considered low. There are few rules that govern trading or regulate information dissemination on the OTC market. For example, volumes and trading books are not publicly available information, which potentially leads to asymmetric information and less efficient price formation. This assessment is relative to the most transparent markets, e.g. exchange-traded financial instruments. Compared to certain aspects of the bond market, transparency is higher, at least for regulators. As this special topic shows, there is a lot of information on the CDS market, but it is not always available to the general public.

**Final remarks and regulatory initiatives**

The main conclusions from the analysis are that, relative to other OTC markets, the sovereign CDS market seems to be fairly well structured and functioning, but still maturing. There is no evidence of any obvious long-term mispricing, nor any evidence that developments in the CDS market cause higher funding costs for Member States. The sovereign CDS market has developed and grown in the past few years, but market participants’ exposures towards euro-area Member States have been broadly stable since the onset of the sovereign debt crisis. These exposures only pose a limited amount of risk as they are generally small, both relative to the total outstanding debt and in relation to dealers’ managed assets. However, transparency for market participants is still lacking in the CDS market, as shown in the previous paragraph.

With the objective of increasing transparency and further reducing systemic risk arising from derivative markets of all kinds, the European Commission has taken several regulatory initiatives. For example, the European Market Infrastructure Regulation (EMIR) requires standardised derivatives to be cleared by a central counterparty (CCP) and all derivatives transactions to be reported to trade repositories. This will provide regulators and supervisors with more information on trading in derivatives and should create a mechanism for detecting the build-up of risks in the market at an early stage. The Regulation on short selling and certain aspects of CDS introduces a disclosure regime for significant net short positions in listed shares and sovereign debt. It also places restrictions on naked short sales of these securities, and imposes a ban on CDS positions that do not serve to hedge exposure to the underlying debt or other correlated securities.