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## Functions and characteristics of corporate and sovereign CDS

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# **Frankfurt School – Working Paper Series**

**No. 203**

## **Functions and characteristics of corporate and sovereign CDS**

by Heinz-Dieter Vogel, Christina E. Bannier, Thomas Heidorn

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## **Abstract**

After the onset of the subprime crisis and the European debt crisis, credit default swaps (CDS) have seen a strong increase in usage. Particularly sovereign CDS protection has been sought after, paralleling the rise in sovereign debt levels, slumps in GDP growth and political tensions in Eurozone peripheral countries. Understanding the strengths and weaknesses of CDS products has hence become ever more important, from both the perspective of individual market participants and regulatory bodies. This paper gives an overview of the origins and characteristics of CDS products by discussing the various stages of the product life-cycle. In a second step, we investigate the development and functioning of the CDS market. We focus particularly on the differences between corporate and sovereign CDS and provide insights into the respective structure of market participants, means of product usage and regulatory conditions.

**Keywords:** Credit default swaps; European sovereign CDS; corporate CDS

**JEL classification:** G12

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## Introduction

The corporate and sovereign credit default swap (CDS) market has shown a remarkable development since its inception in the early 1990s. Over the past two decades the CDS market has become one of the leading indicators of an entity's default risk and the primary hedging and trading tool for credit risk. For a long time the CDS market was almost entirely focused on corporate default risk, as investors perceived the risk of default of developed economies to be very low. However, following the financial turmoil in the United States in 2007/08 and the rising government debt levels in Europe, financial markets reassessed their risk perceptions, particularly vis-à-vis sovereign issuers. A substantial wave of credit risk repricing led to a sharp increase in both the yields on government bonds and the price of credit protection on these debt issues. For some peripheral Eurozone countries this development was so extensive that e.g. protection costs on Greece's debt eventually jumped over 1,000 bps. But also countries generally considered as "healthy" such as Germany experienced a spread increase from 2.6 bps in December 2006 to 136 bps on June 29, 2012.

Even though corporate and sovereign CDS have co-existed for over two decades now, most of the research so far has focused on corporate CDS rather than sovereign CDS. This development can be mostly contributed to the high trading volume of corporate CDS that dominate the credit derivatives market. Previous research has therefore focused on a general description of the function and structure of corporate CDS (Heyde and Neyer, 2010; Weistroffer, 2010; Stulz, 2010; Deutsche Bundesbank, 2010; Amadei et al., 2011) and examined the interrelation between the CDS market and the underlying corporate bond market (Zhu, 2004; Hull et al., 2004; Blanco et al., 2004). The so far limited research on sovereign CDS has mainly focused on emerging market debt (Hassan et al., 2011) as developed economies were seen as bearing only a very small risk of default (Fontana and Scheicher, 2010).

Since the onset of the subprime and the European debt crisis, however, investors' perceptions of developed economies' credit risk has changed substantially. Following the increasing sovereign CDS spreads and trading volumes in recent years, regulatory bodies and market observers started to investigate in particular the European sovereign CDS market in more detail (European Central Bank, 2009; Fontana and Scheicher, 2010; Deutsche Bundesbank, 2010; Palladini and Portes, 2011). However, to the best of our knowledge our study is the first to examine the general differences between corporate and sovereign CDS contracts and markets.

As the CDS market continues to evolve, it is essential to build upon the current understanding of its basic characteristics and functions. We contribute to this endeavour and try to derive from its past development some indications for its future progress, particularly with regard to the sovereign CDS market. To this end, section 2 provides an overview of the origins, functions, structuring and mechanics of CDS products by following the typical product lifecycle. Section 3 investigates the size and structure of the CDS market relative to the overall credit derivatives market. We highlight the structure of market participants and the regulatory system underlying the market. Throughout, we emphasise and review the differences between corporate and sovereign CDS and draw conclusions towards their future development in Section 4.

## Credit Default Swaps

The following section shall provide a detailed overview of the main characteristics of CDS products. We will discuss both the origins of credit-risk transfer and the means to build these functions into financial products and more recent developments leading to a stronger standardization of historically heterogeneous claims.

## Evolution and General Development

The CDS market is fairly young in comparison to other derivatives markets.<sup>1</sup> The first CDSs were created by JP Morgan in 1994 as a way for commercial banks to reduce excess credit risk and extend loan capabilities (Girish, 2010). One of the first CDS written by JP Morgan was created to allow offering a line of credit of USD 5bn to Exxon while maintaining its balance sheet flexibility. To be able to do so, JP Morgan sold this specific credit risk to the European Bank of Reconstruction and Development (EBRD) in return for paying a periodic fee. Hence, effectively the EBRD sold credit insurance to JP Morgan in exchange for payment of an insurance fee.

Since these early beginnings, CDS products have become much more complex and involved. During the late 1990s, CDSs were issued not only on loans of corporate entities but also on various municipal and sovereign bonds. CDSs on sovereign entities, especially in emerging markets, grew substantially in the early years of the twenty-first century increasing to an overall market share of 10% of the OTC market in 2007 (DTCC, 2012). While the CDS markets were largely unregulated before, the near-default of AIG in 2008 – one of the largest protection sellers – led them into the crosshairs of regulators and policy makers.

## Structure and Function

Even though the classical CDS contract shares similarities with a classical insurance contract, CDSs incorporate certain elements that insurance contracts do not. A CDS is in its principal nature over-the-counter (OTC) and highly unregulated. CDSs do not require any funding and banks are not required to hold any reserves, which is different to classical insurance contracts (Noeth & Sengupta, 2012). Consequently, by using CDSs banks can effectively mitigate their concentration of credit exposure and extend their lending capabilities by selling the credit risk to interested parties.

The International Swaps and Derivatives Association (ISDA) defines a CDS as “a bilateral agreement designed to explicitly shift credit risk between two parties” (ISDA, 2012). CDSs generally reference bonds or loans of a sovereign or corporate entity. They belong to the most important credit derivatives products and are traded in various forms.

The most common types of CDSs can be differentiated into two distinct groups. First, CDSs that reference one entity are so called “single-name CDSs” and provide protection for a single sovereign or corporate entity. Multi-name CDSs, in contrast, reference multiple entities. This group also includes index products, basket products, and CDS tranches. Multi-name CDSs have become popular products and are used as proxy hedges or as a means of trading (Weistroffer, 2010). With the evolution of the credit market, structurally more complex products were invented and introduced into the market. For instance, funded or unfunded collateralized-debt-obligations (CDOs) as well as tranching-index CDSs on CDS indices or rating-triggered CDSs were developed. CDSs are also present on the options and

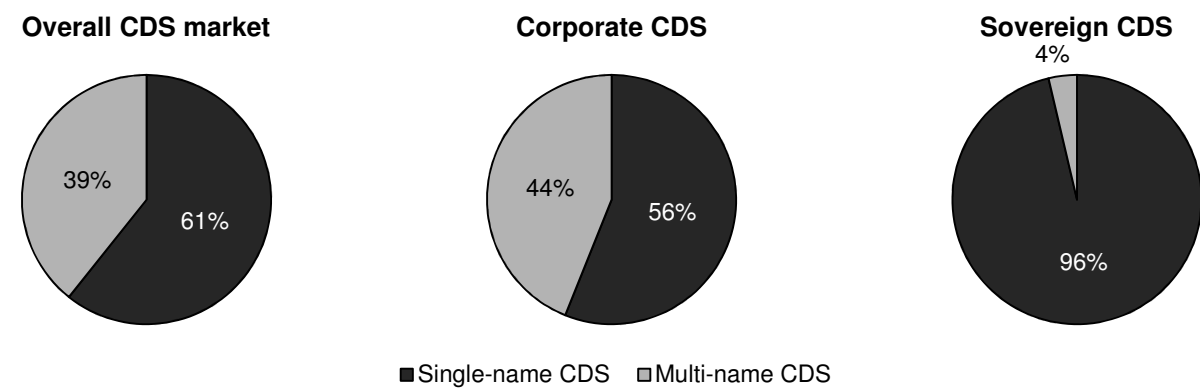
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<sup>1</sup> The options market, for instance, dates back to Aristotle around 350 B.C.

forwards market. These CDSs are so-called “CDS swaptions”, options on CDSs that give the buyer or seller the right to buy or sell protection for a predetermined premium (Heidorn, 2006). With the onset of the recent financial crisis, Fitch (2009) reported that the demand for more complex products has sharply decreased and, in fact, almost entirely disappeared from the market.

In terms of market share, single-name CDSs have become the most important product for both sovereign and corporate markets, as illustrated in Figure 1. At the end of 2011, single-name CDSs accounted for 61% of total gross outstanding notional amounts in the overall CDS market.<sup>2</sup> Among corporate CDS, single-name products accounted for 56%. Among sovereign CDS contracts, single-name CDS were by far the most important type with a share of 96%.<sup>3</sup> Due to this large market share, we will focus on single-name CDS contracts in the following.

Figure 1 – Total CDS transaction Mix by Instrument Type, as of March 2013



Source: Own diagram with data from DTCC (2012).

With a single-name CDS, two parties enter into an agreement where the seller of the contract, the protection seller, promises to insure the buyer of the contract, the protection buyer, against a so-called credit event of a specific underlying obligation of a reference entity. The buyer, in turn, agrees to pay a periodic spread. This spread represents the compensation for the insurance in case of a credit event. While this appears to be analogous to a classical insurance contract where premiums are also paid periodically, the CDS spread is usually fixed, constant<sup>4</sup> over the term of the contract, and paid quarterly. Over the time period that the protection premium is paid, the credit risk is transferred from the protection buyer to the protection seller.

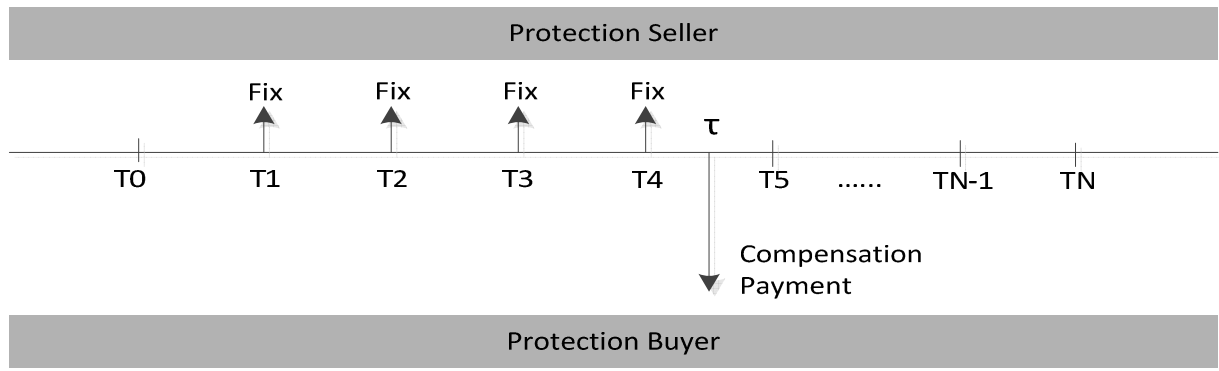
From the perspective of the protection buyer, spread payments are paid in arrears after each period of insurance, as shown in Figure 2.

<sup>2</sup> Own calculations based on data from DTCC (2012).

<sup>3</sup> Calculations based on net notional amounts outstanding for the second half of 2011, provided by DTCC (2012).

<sup>4</sup> With the exception of constant maturity CDS which adjust spread payments every period to the current rate.

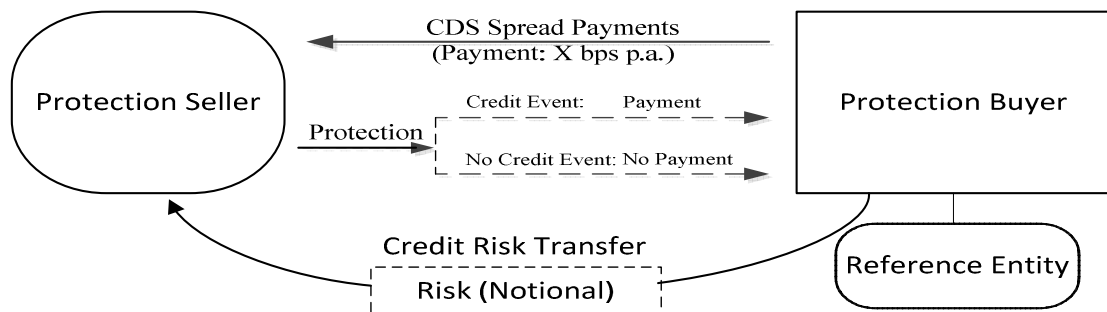
Figure 2 – Cash Flow structure / Payments to Protection Buyer and Seller



Source: Own diagram with reference to Weistroffer (2010).

Figure 2 demonstrates that the protection buyer is obligated to pay a periodic spread to the protection seller until the contract is terminated. Termination occurs either if the contract matures i.e. at time  $T_N$  or if a pre-defined credit event is triggered e.g. at  $\tau$ . Clearly, the buyer profits from the contract if a credit event occurs, whereas the protection seller benefits if no credit event occurs. In case a credit event is triggered at  $\tau$ , the protection buyer is furthermore obliged to pay an accrued spread from  $T_4$  to  $\tau$ . In return, the protection seller must compensate the protection buyer for her loss by paying either the notional amount of the underlying debt obligation (physical settlement) or the difference between the market value of the underlying obligation and the par-amount (cash settlement).<sup>5</sup> In the latter case, the market value of the obligation is usually determined in an auction. The general CDS structure is shown accordingly in Figure 3.

Figure 3 – Structure of a Credit Default Swap



Source: Own diagram with reference to Weistroffer (2010).

## CDS Spread

The spread<sup>6</sup> or the premium of a CDS is the insurance (i.e. protection) compensation of the protection seller for taking on the risk of incurring a loss if a credit event of the reference entity is triggered. CDS spreads are quoted as percentages (in basis points) of the notional value of the specific reference obligation (Packer and Suthiphongchai, 2003). For example as of June 29, 2012, a standard CDS with a notional amount of USD 10m underlying

<sup>5</sup> The settlement method is agreed upon at the origination of the CDS contract. The specific credit event triggers and settlement methods are explained in more detail in Sections 2.7 and 2.9.

<sup>6</sup> In this context, it is important to note, that per definition a spread does not mean a differential between one rate and another rate, but the market price or cost of insurance for the protection buyer and the premium for the protection seller.



value was quoted with a spread of 133 bps<sup>7</sup> to insure against a 10Y Bund of the Federal Republic of Germany.

Following the collapse of Lehman Brothers and the subsequent introduction of regulatory and standardisation requirements, both CDS spread setting and trading changed. CDSs now trade with standard coupon dates, an upfront payment and a standard coupon (Markit, 2009). Standard coupon payment dates are set to March 20, June 20, September 20, and December 20 (Mahadevan et al., 2011). Coupons are no longer paid on a running quote but have been standardised. European sovereign CDSs and corporate CDSs typically use standard coupons of 25 bps or 100 bps but in case of corporate CDSs may also include 500 bps and 1000 bps depending on credit quality. Non-western-European CDS usually have only fixed coupons of 100 or 500 bps with the exception of Japan where CDS also have 25 bps. The upfront payment is required at trade initiation and represents the present value of the difference between the quoted spread and the standard coupon (Naraparaju et al., 2011). If the quoted spread is greater than the standard coupon, the protection seller receives the payment otherwise the protection buyer. This upfront payment tends to be more important for distressed CDSs which quote at higher spread levels.

The payments of a CDS can be separated into two categories: the so-called premium leg and the protection leg. The premium leg is the sum of all periodic spread payments of the protection buyer to the protection seller for taking on the risk. The protection leg is the compensatory payment from the protection seller to the protection buyer contingent on the triggering of a credit event. To be more specific, the expected present value of the protection leg and premium leg need to equal zero at the origination of the contract (Zhu, 2004):

$$\sum_{i=1}^N e^{-rt_i} Q(t_i) \rho = \int_0^{t_N} e^{-rt} (100 - M_t) q(t) dt \quad (1)$$

The left hand side corresponds to the premium leg and the right hand side to the protection leg, where  $r$  represents the constant risk-free rate and  $Q(t)$  the risk neutral survival probability at time  $t$ .  $Q(t)$  is the risk neutral survival probability at any point in time  $i$  being equal to the function  $1 - \int_0^{t_i} q(t) dt$ ,  $M(t)$ , the market value of the underlying asset, and  $\rho$  the CDS spread (Zhu, 2004).

The spread is paid until the contract expires, which occurs if either the maturity of the contract is reached or a credit event of the underlying reference entity is triggered. In such a case, the protection buyer will receive a compensatory payment that is determined in the settlement process.<sup>8</sup> The spread depends on several key characteristics of the reference entity (Zhu, 2004) such as the probability of default and the assumed recovery rate in default. In general, the spread will be higher for a riskier entity than for a less risky entity.

## Reference Entities

The reference entity is the entity whose credit risk is securitised and traded. Most commonly these are corporate as well as sovereign entities. It is important that a CDS clearly specifies the reference entity that it protects. Given the existence of multiple legal entities, a default of one of these entities at the credit event date would not necessarily imply the default of the other entities. For example, a company may be subordinated and thus be associated with another company. However, a default of the subordinated company would not

<sup>7</sup> Bloomberg data, as of 29 June 2012, quarterly act/360

<sup>8</sup> See chapter 2.9 and 2.7 for further reference to settlement and credit events, respectively.

necessarily lead to the default of the parent company. To define what constitutes as a sovereign entity, ISDA (2003) declares that a sovereign may be “any state, political subdivision or government, or any agency, instrumentality, ministry, department or other authority (...) thereof”.

Currently, the most actively traded sovereign and corporate reference entities worldwide are illustrated in Table 1. As of March 2012, the largest notional amounts outstanding of sovereign CDS are with reference to debt obligations of distressed Eurozone countries i.e. Italy and Spain. Among the top 15 sovereign reference entities are also other Eurozone peripheral countries such as the Hellenic Republic and Portugal. Comparing the top 15 corporate and sovereign CDS reference entities shows that in terms of gross notional amounts sovereign CDSs significantly exceed corporate CDSs. This could be an indication of the large hedging and trading activities that result from increased investors’ fear of a sovereign default in the on-going European debt crisis. On the other hand, net notional amounts are fairly similar to those of corporate CDS entities. Notional amounts outstanding represent the par amount of CDS protection bought or sold. While gross amounts correspond to the total sum of all CDS contracts, net amounts refer only to the net-risk positions of the contracting parties.

Table 1 – Top 15 Sovereign and Corporate Reference Entities

Reference Entity	Gross Notional (USDm)	Net Notional (USDm)	Contracts	Region
<b>Sovereigns:</b>				
REPUBLIC OF ITALY	324,303	22,237	9,918	Europe
KINGDOM OF SPAIN	164,331	14,549	6,870	Europe
FED. REPUBLIC OF BRAZIL	162,791	18,575	10,282	Americas
REPUBLIC OF TURKEY	145,845	5,785	9,730	Europe
UNITED MEXICAN STATES	125,614	8,401	8,940	Americas
RUSSIAN FEDERATION	115,342	4,239	9,149	Europe
FED. REPUBLIC OF GERMANY	114,124	19,664	4,275	Europe
JAPAN	74,812	9,744	7,425	Japan
REPUBLIC OF KOREA	71,730	5,174	8,218	Asia Ex-Japan
REPUBLIC OF HUNGARY	70,538	2,541	6,525	Europe
HELLENIC REPUBLIC	69,331	3,183	4,369	Europe
PEOPLE'S REPUBLIC OF CHINA	68,413	8,799	7,773	Asia Ex-Japan
PORTUGUESE REPUBLIC	67,300	5,201	3,941	Europe
UNITED KINGDOM	63,741	12,024	4,239	Europe
KINGDOM OF BELGIUM	62,489	5,609	3,326	Europe
<b>Corporates:</b>				
GENERAL ELECTRIC CAPITAL	97,718	10,883	7,606	Americas
MBIA INSURANCE	89,956	3,189	8,747	Americas
BANK OF AMERICA	84,702	5,910	9,503	Americas
JPMORGAN CHASE & CO.	81,189	4,880	8,196	Americas
MORGAN STANLEY	79,731	4,635	7,577	Americas
GOLDMAN SACHS GROUP	76,726	5,058	7,583	Americas
GAZPROM	62,826	2,409	5,967	Europe
WELLS FARGO & COMPANY	61,732	4,822	6,859	Americas
CITIGROUP INC.	60,774	3,168	5,834	Americas
DEUTSCHE BANK	60,702	4,839	6,597	Europe
BANCO SANTANDER	59,935	2,720	6,572	Europe
TELECOM ITALIA SPA	58,974	2,674	6,442	Europe
DEUTSCHE TELEKOM	55,816	3,528	6,100	Europe
DAIMLER	55,334	2,874	6,338	Europe
FRANCE TELECOM	53,658	2,190	5,666	Europe

Source: Own illustration based on DTCC (2012) as of March 2012.

## Contract Sizes and Maturity

Since CDSs are over-the-counter (OTC) products, their size and maturity depends on the demands and requirements of both counterparties. Usually gross CDS contracts' notional amount ranges in-between USD 5 million and USD 20 million. Maturities extend from one to ten years with five years being the most frequently traded CDS maturity (Whetten et al., 2004). Table 2 shows that among the top 1000 single-name CDSs, the average corporate CDS trade size is USD 6.4 million, while the average sovereign CDS size is USD 10.5 million. Also liquidity differs between corporate and sovereign contracts: For corporate CDSs liquidity is fairly high across all maturities, whereas for sovereign CDSs only contracts with maturities of up to five-years have been liquid for a long time. This has changed with the onset of the subprime and financial crisis which increased activity and liquidity also for CDSs of longer maturity.

Table 2 – Trade size in the corporate and sovereign CDS market

	number of reference entities	mean trade size (mln. US \$)	median trade size (mln. US \$)	modal trade size (mln. US \$)
Top 1000 single-name	898	6.6	6.3	5.0
Corporate	839	6.4	5.8	5.0
Sovereign	59	10.5	10.0	7.1
Index CDS	86	55.5	45.0	25.0

Source: Calculation on DTCC data. Data from June to September 2011. Average trade size is calculated dividing average daily traded notional amount by the average daily number of trades using the publicly available DTCC data. Entities with average numbers of daily trades equal to zero are excluded causing a divergence from the total number of reference entities in Table 1.

Source: (Whetten, et al., 2004).

## Currencies

A key consideration for CDS contracts is the choice of underlying currency. This is particularly important for market participants considering the trade of a sovereign CDS. If a sovereign entity defaults on its obligation, a currency devaluation or redenomination might occur (Haworth et al., 2010). In this case, a credit event may well lead to a higher volatility in the currency in which the CDSs are denominated and contribute to a significant weakening of the currency. Therefore, standard CDSs on the Federal Republic of Germany or any other Eurozone country trade in several currencies, but most often in USD in order to diversify currency exposure (Haworth et al., 2010).

As of March 2012, more than 61% or 1.5 million CDS contracts were denominated in US Dollar making it the preferred CDS currency among market participants as illustrated in Table 3. The US Dollar is followed by Euro-denominated contracts with a market share of 35% or 900 thousand among all outstanding CDS contracts.

Table 3 – Daily Aggregate Open Interest by Currency of Denomination

Currency	Gross Notional Amount	Number of Contracts
AUD	1,866,155,000	173
CAD	9,123,275,000	1,172
CHF	776,650,000	50
EUR	8,308,283,408,108	869,155
GBP	18,333,449,592	3,025
HKD	793,475,000	33
JPY	33,831,459,674,008	50,957
SGD	533,850,000	129

USD	15,779,140,496,006	1,506,011
Other Currencies (in USD)	16,513,425	3
<b>Total</b>	<b>57,948,460,791.139</b>	<b>2,430,708</b>

Source: Own diagram with data from DTCC (2012) as of March 2012.

## Credit Events

Credit events refer to “any credit-related event that triggers a contingent payment in a credit default swap” (Benhamou and Wong, n.d.). The precise definition of a credit event has to be pre-specified and documented in the original contract. A credit event trigger is one of the most critical elements of the contract as it determines when the protection seller is obliged to compensate the protection buyer. Even though sovereign CDSs are OTC products, many market participants follow the standardised definitions by ISDA (2003). Credit events can also be classified as hard or soft credit events. Hard credit events are triggered automatically once the ISDA Determination Committee (DC)<sup>9</sup> states that a credit event has occurred, e.g. a failure to pay. A soft credit event, in contrast, has the option of being triggered, such as a debt restructuring.

ISDA (2003) defines as the main credit event triggers bankruptcy, failure to pay, repudiation, and restructuring. From a contractual point of view, differences between European sovereign CDSs and corporate CDSs are evident. Table 4 provides an overview of credit-event triggers contained in most CDS contracts.<sup>10</sup>

Table 4 – Credit Event Triggers for Sovereign CDS and Corporate CDS

	<b>Bankruptcy</b>	<b>Failure to Pay</b>	<b>Repudiation/ Moratorium</b>	<b>Restructuring (Old R)</b>	<b>Restructuring (Mod Mod)</b>	<b>Restructuring (Multiple Holder Obligation Requ.)</b>
West. European Sovereign	No	Yes	Yes	Yes	No	Yes
European Corporate	Yes	Yes	No	No	Yes	Yes

Source: Own diagram with reference to (ISDA, 2012).

As can be seen from the table, European corporate CDSs’ credit events are triggered through bankruptcy, failure-to-pay and restructuring events. Western European sovereign CDSs on the other hand do not trigger in case of a bankruptcy event, due to the low likelihood of a sovereign declaring bankruptcy. Instead, they include a repudiation or moratorium.

A bankruptcy credit event only applies to corporate CDSs. It is triggered when the reference entity files for bankruptcy or insolvency. ISDA (2003) specifies that an event occurs not only after a filing but also if the reference entity takes action<sup>11</sup> that might lead to a filing for insolvency, liquidation, or an act of bankruptcy.

The failure-to-pay event refers to cases in which either the corporate or sovereign reference entity fails to make a payment on an obligation. Ecuador was the first sovereign entity to trigger a credit event under the failure to pay clause in 2009 (Creditex, 2012).<sup>12</sup> The

<sup>9</sup> The Determinations Committees are set up for each individual region. For EMEA, they currently consist of ten voting dealers and five voting non-dealers. Their objective is to determine credit events and auctions.

<sup>10</sup> These are periodically determined and published by ISDA from the physical settlement matrix and provide an update on the most commonly used provisions (ISDA, 2012).

<sup>11</sup> These actions are specified in more detail in the ISDA 2003 definitions.

<sup>12</sup> An overview of countries that experienced credit events are summarised in (Naraparaju, et al., 2011).

reference entity is given a grace period of three business days after the specific payment date, after which the event is triggered (Naraparaju et al., 2011).

Repudiation or moratorium is exclusive to sovereign CDS contracts. Two things are required before such an event is triggered. First, a government agency of the respective reference entity disclaims, invalidates one or more obligations, or imposes a moratorium, rollover or deferral of one or more obligations. This is also called a potential repudiation or moratorium. The second occurrence is a failure-to-pay or a restructuring event with regard to one or more obligations on or prior to the repudiation moratorium evaluation date (Haworth et al., 2010).

The restructuring event is the most important event for sovereign CDSs, as it is the most likely event to be triggered (Naraparaju et al., 2011). It refers to the altering of the relevant obligation terms and is a direct or indirect consequence of a deterioration of the reference entity's creditworthiness. For a restructuring event to be triggered, a reduction in the rate or amount of interest, a reduction in the amount of principal, a postponement of payments of interest/principal/premium, or a change in the currency<sup>13</sup> in which the payment of interest or principal is carried out has to occur (Naraparaju et al., 2011). Table 4 outlines how the restructuring events apply for most of the sovereign and corporate CDS contracts, with the exception that they do not trade under the same restructuring clause. Corporate CDSs trade under the modified or modified-modified restructuring clause, whereas sovereign CDSs trade under the old restructuring clause of 1999. The main difference is the maturity limitation of the deliverable obligation, which is not limited under the old restructuring clause of 1999. In comparison to other credit events, a restructuring is a so-called soft-credit event, because it allows both buyers and sellers of CDSs to vote on whether a credit event occurred or not. This has to be coercive amongst bondholders, meaning that the event is only binding for all bondholders after it has been agreed upon by a certain amount of bondholders (Haworth et al., 2010). Otherwise, the credit event does not trigger even if the Determination Committee (DC), which is responsible for determining credit events, declares that a restructuring event has occurred.

A clear and precise formulation of credit events is important, as the example of Greece's write-down and exchange of certain obligations has shown. The triggering of a possible restructuring credit event for Greece has been disputed, because the DC did not trigger the outstanding Greek CDS contracts. As a consequence, market participants began to question the effectiveness and the usefulness of sovereign CDSs (Cünneen, 2012). It was only after the collective action clauses (CACs)<sup>14</sup> were applied and enforced by the government to all bondholders to participate in the debt write-down that a restructuring event occurred (Quenby et al., 2012). If on the other hand the decision to restructure were coercively decided among bondholders to bind, the restructuring event would not have triggered.

### Obligation Characteristics

For CDS contracts, the fixing of the reference obligations characteristics is an important aspect of the documentation. It states the possible obligations that are qualified to trigger a credit event. For European sovereign CDSs as well as for corporate CDSs, it is common to include the term "borrowed money" as an eligible obligation category (ISDA, 2012). This

<sup>13</sup> A redenomination into a G7 currency or OECD currency is permitted. In the latter case, a AAA-rating by Moody's, Fitch or S&P is required.

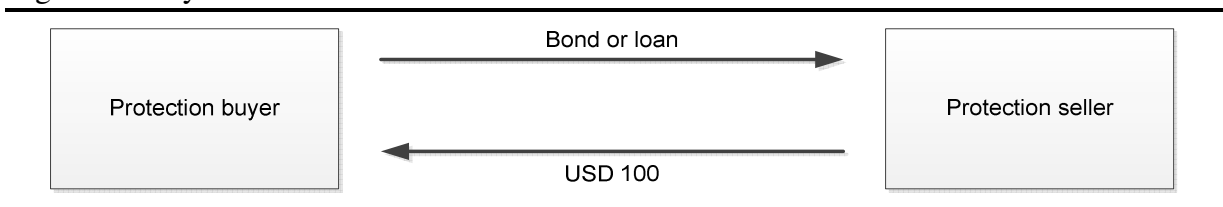
<sup>14</sup> CACs are clauses, which "allow bondholders to agree on debt restructuring even when some bondholders are against restructuring as long as majority agrees" (NASDAQ, 2012).

includes not only bonds or loans, but also any form of obligation for repayment or repayment of borrowed money (Naraparaju et al., 2011). Most sovereign CDS contracts also require that obligation instruments must not be subordinated and ask for a denomination in a specific currency—for European CDS this usually includes US Dollar, Euro and Japanese Yen. These characteristics apply further to the so-called deliverable characteristics, which are required following a credit event (Haworth et al., 2010) and will be outlined in the next paragraph.

### Settlement Methods

Once a credit event has been triggered, a settlement between the protection buyer and seller has to be carried out. The mechanics of the settlement used to depend on the method agreed at the origination of the contract. Market participants could either settle via a physical settlement or a cash settlement.<sup>15</sup> However, with the introduction of the auction settlement in the “big-bang-protocol” and “small bang protocol” in 2009,<sup>16</sup> the market standard changed and it is now standard to settle via an auction (Haworth et al., 2010). Nevertheless, because it is still possible to settle without an auction, e.g., for smaller entities, each settlement method shall be briefly reviewed.

Figure 4 – Physical Settlement Method



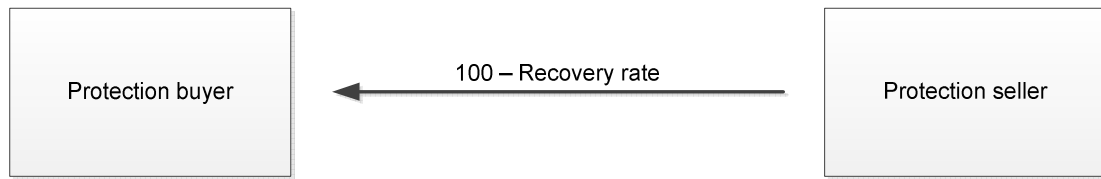
Source: Own diagram.

Physical settlement involves the transfer of the underlying obligation, i.e., the government or corporate bond or any other deliverable obligation from the protection buyer to the protection seller, as Figure 4 illustrates. In return, the protection buyer receives the full face value as compensation. For a long time, the physical settlement of CDS contracts was the preferred choice due to the market’s primary usage of CDSs as a hedging tool. In 2005, more than 73% of CDS contracts were pre-specified with a physical settlement, leaving only 23% of the contracts as cash-settled (BBA, 2006). Since then, CDSs have turned into trading instruments and primary indicators of entities’ creditworthiness, and volumes for sovereign and corporate CDSs have risen to levels that outstrip the total outstanding bond volume (Markit; Creditex, 2010). Significant increases in market prices were then likely once investors realised that the required amount of bonds were not available to settle the total amount of outstanding CDS contracts. Consequently, in 2005, market participants introduced standardised auction procedures in cooperation with the ISDA. The objective was to enable markets the settlement of large entities’ defaults under transparent and efficient methods (Duquerroy et al., 2009). Another factor contributing to the choice of standardised auction procedures was the otherwise complex and opaque way to determine the market value of the underlying obligation at the settlement date.

<sup>15</sup> A third settlement method exists by paying a fixed amount. However, this method is highly uncommon and thus not included in the scope of this paper.

<sup>16</sup> These are protocols introducing standardisation by the ISDA in 2009. A more detailed analysis of these protocols is given in Section 4.

Figure 5 – Cash Settlement Method



Source: Own diagram.

In 2012, cash settlement has become the primary settlement method for European sovereign entities as outlined in the physical settlement matrix published periodically by the ISDA (2012). With a cash settlement, the protection buyer does not have to deliver the underlying obligations anymore. The protection seller is required to transfer a specific amount of cash to the protection buyer. This amount is the difference between the bond's nominal value and the market value at the time of settlement. It is determined via an auction, as recently undertaken for Greece in 2012. Since the auction has become an integral part of the global sovereign CDS markets, a brief overview of this process shall follow.<sup>17</sup>

Since the “big-bang protocol” and “small-bang-protocol” were introduced by the ISDA in 2009, auction settlements are now hard-written into the standards (Markit, 2009). The auction provides a mechanism to determine the final market price that establishes cash settlements and physical settlements. The auction process is divided into two steps. First, initial markets are set up and open interest is posted by dealers and their clients. This step involves the option for market participants to request a physical settlement at the final auction price. The purpose of this step is to determine the initial market midpoint (IMM), which is the initial recovery rate, and a net open interest (NOI), which can be interpreted as the imbalance of buy and sell orders for bonds during the auction. The second step is the determination of the recovery rate by putting bids and offer prices at price levels where bid and offer meet with the net open interest determined in the first step (Creditex, 2010).

### CDS Market Size and Structure

The global CDS market has seen a tremendous increase in both absolute and relative terms since its inception in the mid-1990s. During the past twenty years the CDS market has developed from a small and fairly exotic branch of the credit derivatives market to a sizeable trading market. This development has been appreciated for its potential to diversify credit risk more widely over the economy. However, the onset of the financial market turmoil in 2007 has raised concerns of a de-stabilizing use of CDS contracts. Particularly the increasing market volumes and spreads of Eurozone sovereign CDS in 2010 and 2011 have met a mixed response from market observers and politicians. Nevertheless, Eurozone corporate and sovereign CDS have become an important tool for financial institutions to mitigate or take on credit risk. We will investigate the development of CDS markets in the following, laying out both the strengths and weaknesses of the current market structures with particular regard to stability issues.

### Size of the CDS Market

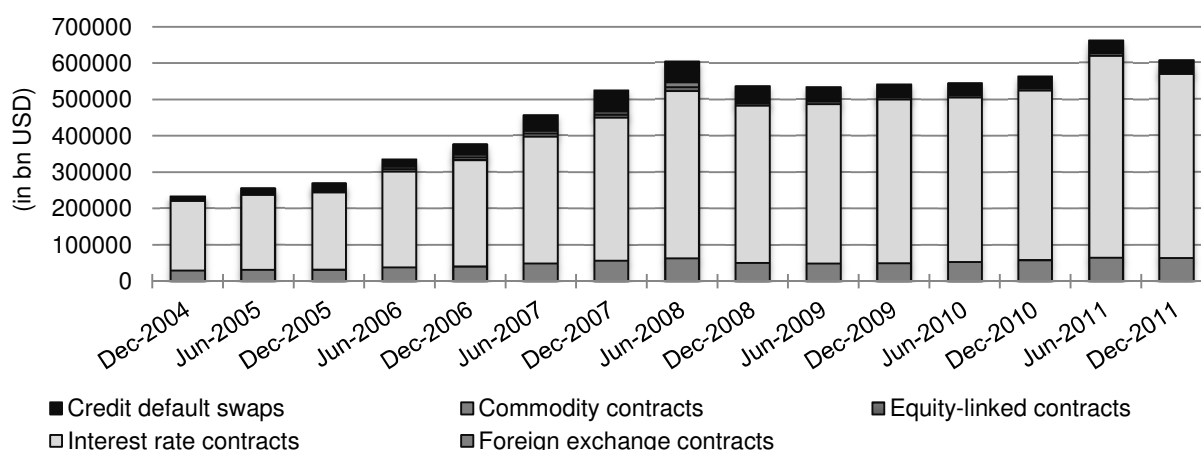
The size of the CDS market is usually measured in terms of notional amounts outstanding. This represents the par amount of CDS protection bought or sold and is closely related to the underlying obligations' notional amounts. Notional amounts can be denoted in

<sup>17</sup> It is possible to settle outside of an auction; however this is more relevant for corporate CDSs.

gross or net terms. Gross notional amounts outstanding correspond to the sum of all CDS contracts finalised between market participants and for all reference entities. Net notional amounts are the sum of the institutions' net-risk positions. They hence include only the netted amounts outstanding that have been bought or sold. Market values are a measure of the replacement costs in the event of a default (Deutsche Bundesbank, 2010; Fontana and Schleicher, 2010). A major drawback of this measure is the limited availability of public data due to the OTC mechanics of this market. Contrary to exchange-traded securities, specific data is often not made public for OTC transactions. This may result in inaccuracies and, depending on the data source, in differences in assessments.

Since their inception, CDS have demonstrated a strong increase in market share. Within the credit derivatives market, CDS market size has steadily risen up until the financial crisis 2007/08. However, in comparison to the overall OTC derivatives market, sovereign CDS and corporate CDS still represent only a small fraction, as illustrated in Figure 6. The majority of OTC derivatives are interest-rate contracts with over 70% market share during the period 2004 to 2012.

Figure 6 – Overall OTC Derivatives Market Overview

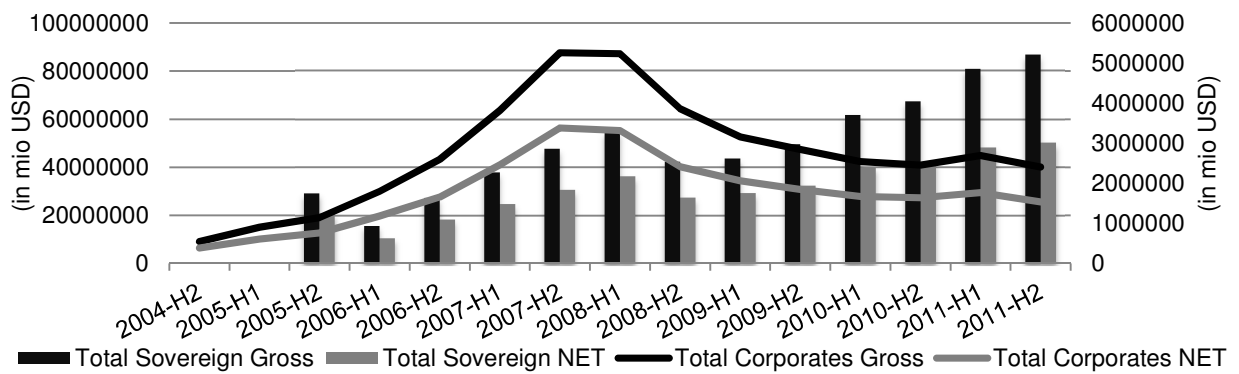


Source: Own diagram with data from BIS (2012) as of June 2012.

CDS gross notional amounts outstanding grew from a market share in the overall over-the-counter derivatives market of 2% in 2004 (USD 6 trillion) to 10% (USD 58 trillion) at the peak in 2007 and fell back to 4.5% (USD 28 trillion) in 2012. The proportion of sovereign CDS' notional amounts outstanding in comparison to corporate CDS shows that the size of the corporate and sovereign CDS market differs substantially (Figure 7). Before 2009, sovereign CDS represented a smaller market in terms of both gross and net notional amounts outstanding. Sovereign CDS net notional amounts increased from USD 640 billion at the start of 2006 to USD 2.1 trillion at the peak in 2007.



Figure 7 – Corporate vs. Sovereign CDS Notional Amounts Outstanding



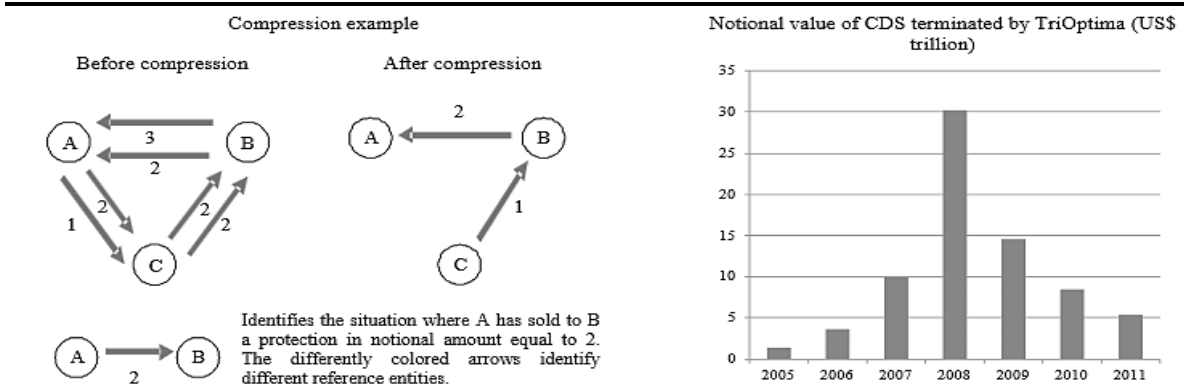
Source: Own calculations and diagram, with data from BIS (2012). Data before 2005 could not be retrieved for sovereign notional amounts outstanding. The left axis displays corporate CDS notional amounts outstanding and the right axis sovereign CDS notional amounts outstanding.

While the corporate CDS market started to decline from 2007 on, the sovereign CDS market showed a drop only in the second half of 2008 and 2009 which was followed by an increase in gross and net notional amounts. From 2009 to the end of 2011 gross sovereign CDS notional steadily increased from USD 2.6 trillion in the first half of 2009 to USD 5.2 trillion in the second half of 2011, doubling its size during that period. Net sovereign CDS notional amounts increased by 77% from USD 1.7 trillion to USD 3.0 trillion.

Potential explanations for the increase in the size of the sovereign CDS market could be the reassessment of credit risk for developing countries and corresponding hedging activities after the collapse of Lehman Brothers. The reduction in corporate CDS market size, in contrast, may be explained by the appreciation of the EUR to the USD since notional amounts are usually reported in USD on banks' balance sheets. Additionally, many market participants were deleveraging their balance sheets after the financial crisis by use of so-called trade compression (Deutsche Bundesbank, 2010).<sup>18</sup> These were mostly applied bilaterally between dealers after the collapse of Lehman Brothers to mitigate the outstanding notional amounts of dealers. According to Duquerroy (2009), TriOptima, the leader in compression services, reduced over 30.2 trillion USD of CDS contracts in 2008, as Figure 8 illustrates. These processes are, however, driven by markets between dealers and thus have only a small sustainable impact on the market per se, because they do not incorporate a standardised procedure between participants (ICE, 2010).

<sup>18</sup> Trade compressions refer to the active reduction of gross notional amounts outstanding without altering the risk profile. This was calculated via the determination of offsetting claims between market participants and eliminating these by paying off or compensating the respective party (Deutsche Bundesbank, 2010, p. 47).

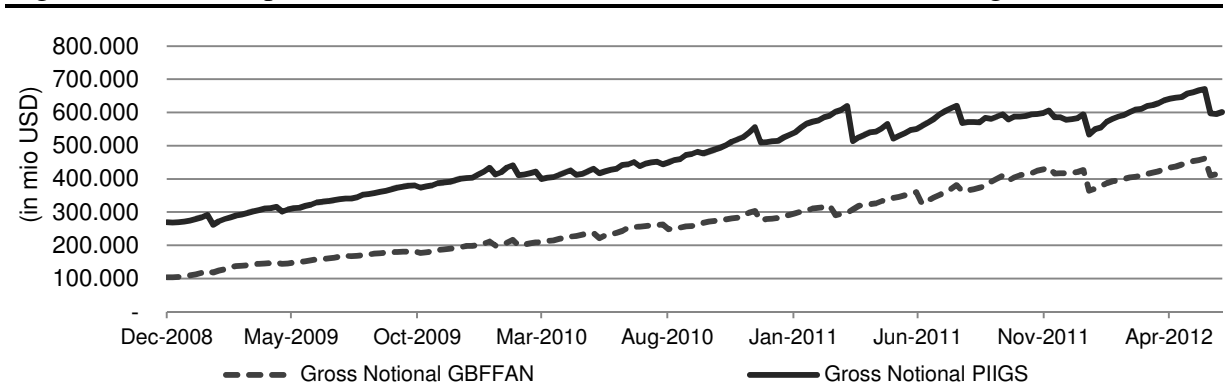
Figure 8 – Example of the CDS compression method and the value of CDS terminated



Source: International Organization of Securities Commissions (2012) with reference to Bank for International Settlement and TriOptima.

Since the Eurozone sovereign CDS market gained importance particularly after the onset of the European debt crisis in 2009/10, more detailed insights into this market may be in order. According to DTCC (2012) and the authors' own calculations, the Eurozone sovereign CDS market had an approximate share of 20% of the overall sovereign CDS market in the second half of 2011. Figure 9 gives a more detailed illustration of the development of notional amounts for this market. It shows the development of gross and net notional amounts outstanding for two synthetic CDS indices that the authors created. Both indices are constructed for the period of October 2007 to June 2012, grouped by the reference entities' CDS-spread levels and each index constituent is equally-weighted. Hence, GBFFAN (denoting Germany, Belgium, France, Finland, Austria, and the Netherlands) contains the low-risk Eurozone sovereign CDS, while PIIS (Portugal, Italy, Ireland, and Spain) contains the high-risk Eurozone sovereign CDS. Further details on index construction are available from the authors upon request.

Figure 9.1 – Development of Gross Notional Amounts for Eurozone Sovereign CDS

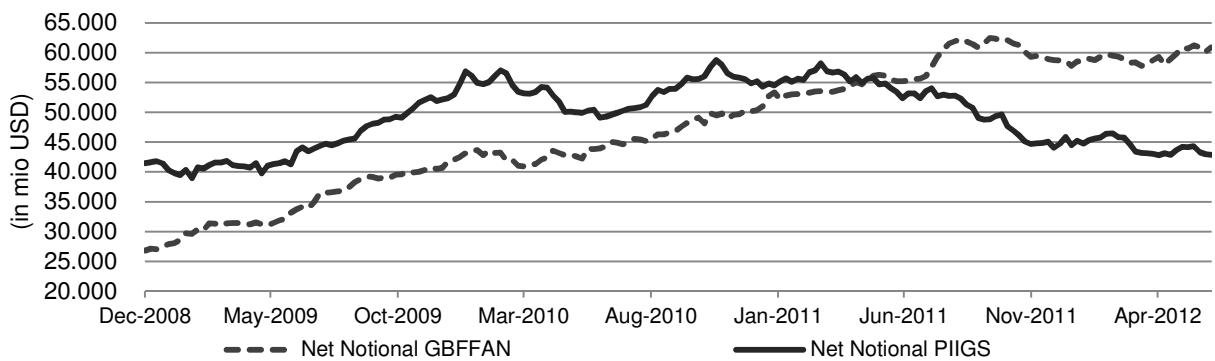


Source: Own contribution. Diagram and calculations based on data from DTCC (2012).

Figure 9.1 and 9.2 demonstrate that after the onset of the financial crisis, activity on European sovereign CDS markets increased steadily. This development is recognised for both indices in terms of gross notional amounts. Even though on different levels, a general increase for both indices is evident following the Lehman bankruptcy in the fall of 2008, from USD 104 billion for GBFFAN and USD 269 billion for PIIS to USD 409 billion and USD 569 billion, respectively. Interestingly, net notional amounts outstanding remained fairly stable for the index PIIS over the entire observation period whereas a steady increase in the net amount of CDS protection was observed for the index GBFFAN, as illustrated in Figure 9.2.

For the PIIGS index this development might bear the conclusion that market participants did not seem to have increased their hedging activity, seeking insurance against potential sovereign defaults, but raised their pure trading activity in the market. Unlike the stable development of notional amounts for the PIIGS, the GBFFAN index illustrates a steady increase in net notionals from 2008 to 2012. In Q2 2011 the net notional amounts even exceeded those of the PIIGS. One interpretation might suggest that market participants were increasingly concerned about the credit risk of less risky countries, such as Germany and France, and increased their hedging activities.

Figure 9.2 – Development of Net Notional Amounts for Eurozone Sovereign CDS



Source: Own contribution. Diagram and calculations with data from DTCC (2012).

In light of this market expansion, it is interesting to analyse the notional amounts outstanding for individual Eurozone sovereigns. Table 5 provides an overview of the development of gross notional amounts, net notional amounts, and their changes from 2010 to 2012 as well as from January to June 2012. As can be seen, gross notional amounts and net notional amounts vary substantially among Eurozone countries. France and Germany display relatively small gross notional amounts: USD 144 billion and USD 118 billion, respectively. In contrast, more distressed economies such as Italy and Spain have gross notional amounts outstanding of USD 322 billion and USD 167 billion, respectively. This is also reflected in the ratio of gross notional amounts to GDP, which is relatively small for France, Germany and the Netherlands (ranging between 4% and 6%), but much higher for Spain, Portugal and Ireland (ranging between 17% and 27%).

The changes in gross notional amounts of each sovereign since the beginning of the European debt crisis show an interesting pattern. Since 2010, Germany and France have experienced an increase in gross notional amounts of 98% and 205%, respectively. This change is on an unprecedented scale. In comparison, gross notional amounts for peripheral countries such as Spain, Portugal, Ireland, and Italy increased over the same period only by 77%, 23%, 44%, and 45%, respectively. Since these countries were seen to bear much higher credit risk and a number of political actions over the considered time period contributed also to high volatility in default risk perceptions, these small changes are quite surprising. Even more interesting is the comparison from January to June 2012 basis. Given the small changes in gross notional amounts in Spain and Portugal in 2012, it appears that the largest market activity in these countries' CDS took place in 2010 and 2011. Only Italy and Ireland display a more significant change in gross notional amount also in 2012. In contrast, in the low-risk countries France and Germany, a large part of the overall market activity took place in 2012. It hence seems that in 2012, the market focus quite clearly shifted away from a general

concern with higher-risk countries to a stronger emphasis on lower-risk countries and only some specific high-risk countries.

Table 5 – Notional Amounts Outstanding for Eurozone sovereign CDS

	France	Germany	Italy	Spain	Austria	Belgium	Portugal	Netherland	Ireland	Finland	Greece
Gross Notional Amount (USD bn)	143,81	118,40	321,94	166,76	53,982	59,96	66,25	28,55	46,31	16,76	82,45
$\Delta$ % (Jan 10 - Jun 12)	204.5%	97.87%	44.55%	76.64%	36.50%	122.65%	22.60%	97.43%	43.51%	64.56%	n/a
$\Delta$ % (Jan 12 – Jun 12)	52.72%	28.14%	12.30%	0.66%	8.85%	15.67%	0.25%	28.78%	12.43%	7.67%	n/a
Net Notional Amount (USD bn)	23,45	21,14	20,71	13,94	5,33	4,83	4,58	3,78	3,65	2,35	3,06
$\Delta$ % (Jan 10 - Jun 12)	153.0%	76.39%	-13.27%	-0.56%	-41.46%	-14.33%	-48.90%	6.91%	-39.95%	-6.00%	n/a
$\Delta$ % (Jan 12 – Jun 12)	15.95%	27.76%	-14.00%	-25.44%	-13.71%	-32.08%	-25.01%	33.20%	-15.00%	0.24%	n/a
Gross Notional (% of GGP)	6.33%	4.42%	13.04%	16.97%	19.12%	12.53%	27.49%	5.60%	20.95%	14.16%	23.2%
Net Notional (% of GGP)	1.03%	0.79%	0.84%	1.42%	1.89%	1.01%	1.90%	0.74%	1.65%	1.99%	0.86%

*Source: Own diagram with data retrieved from DTCC (2012) and EUROSTAT as of June 30, 2012. The period covers March 2012 to June 2012. All values in USD. Total debt outstanding constitutes Q1 2012 figures in USD and measured as general government debt (GGD). Converted to USD with the exchange rate as of June 19, 2012. Notional amounts for Greece constituted as of March 2012.*

With regard to net notional amounts outstanding, French (USD 23 billion) and German CDS (USD 21 billion) show the largest size. It is interesting to note that despite the large gross notional amount of Italian CDS, its net amount (USD 21 billion) is even slightly smaller than Germany's and Spain's is much lower (USD 13.93 billion). The contrarian development from 2010 to 2012 in net notional amounts for the low-risk countries (increases in net amounts) vis-à-vis the high-risk countries (reductions in net amounts) is indeed striking. One interpretation could be that market participants have started to hedge their positions for the peripheral countries' debt much earlier, so that they could afford to reduce this insurance over the time period considered in Table 5. A less innocuous interpretation, however, would be that particularly in 2012 market participants' activities were driven less by hedging needs but rather by the wish to profit from developments in spread differences between high- and low-risk countries. This could indeed refute the presumed stabilizing function of risk-diversification via CDS products.

With regard to the respective changes during this period, we observe that net notional amounts outstanding increased for low risk-countries such as France, Germany and the Netherlands between 2010 and 2012 but decreased for all other countries, particularly for Italy, Austria, Belgium, Portugal and Ireland. These decreases moreover seem to be most pronounced in 2012 as the analysis for the period from January to June 2012 shows. Particularly Spain displays a strong reduction in net notional amounts in the early months of 2012.

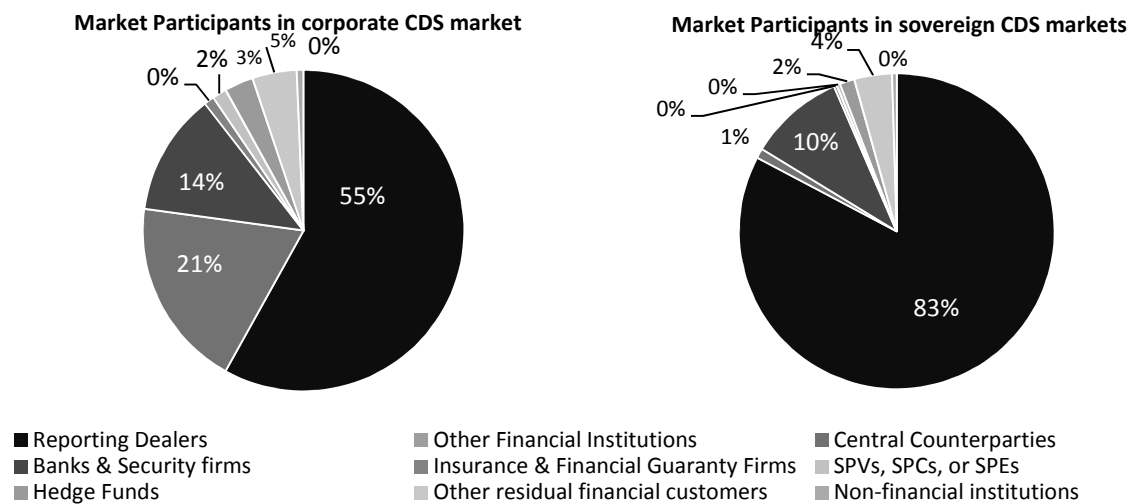
The developments of the gross and net notional amounts might seem substantial; however, in comparison with the size of the total government debt market for the respective countries Table 5 illustrates that the Eurozone sovereign CDS market remains small in proportion. The ratio of notional amount outstanding to total debt outstanding shows that, even with the rapid expansion throughout 2010 and 2011, sovereign CDSs remain comparatively small to the total amount of government debt outstanding. The largest proportions of gross notional amounts to total debt outstanding are found for Portugal (27%) and Ireland (21%). The average ratio for gross notional amount to total debt is 15% across this sample. In net exposures, this is even smaller, with the CDS market only representing 1% on average of the total debt of the individual countries. Comparing the total sovereign CDS

market ratios with those of the corporate CDS market, the IMF (2010) reports, that the corporate CDS market is approximately equal in size to global gross government bond market.

### Market Participants

Because CDSs are traded OTC between dealers, it is challenging to quantify the trading amounts of individual counterparties and identify the degree of participation of each market player in the CDS market. Following the classification of the DTCC (2011), market participants can be classified into three specific groups: reporting dealers, other financial institutions, and non-financial institutions. These three categories, however, remain vague as investment banks tend to be included in the ‘reporting dealer’ classification but could also be allocated to ‘other financial institutions’ under ‘banks and security firms’. Starting with the European Market Infrastructure Regulation (EMIR) the regulation will have information on CDS securities and individual firms. A further breakdown of these categories needs to follow.

Figure 10 – CDS by Counterparty Type



Source: Own diagram and calculations with data from DTCC (2012). Data reported from the DTCC illustrate both notional amounts bought and sold with reference to their category of counterparty. Counterparties with a value of 0% only have marginal market share.

Figure 10 illustrates a comparison between the net amounts of protection bought and sold by market participants at the end of 2011. In both the corporate and sovereign CDS markets, reporting dealers are the most important participants because they take the largest portion of the total market with a total share of 55% and 83%, respectively. This is confirmed by interviews and market surveys such as Fitch Ratings (2009) and SEC (2012). This concentration might also have increased after the financial crisis and the exit of several major derivatives dealers such as Lehman Brothers, Merrill Lynch, and Bear Stearns (European Central Bank, 2009). The top dealers identified with the highest outstanding notional amount for corporate and sovereign CDS are shown in Table 6.<sup>19</sup>

Table 6 – Overview of CDS Dealers

in USD bn	J.P. Morgan	Goldman Sachs	Morgan Stanley	Deutsche Bank	Barclays	Bank of	Citibank
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<sup>19</sup> The largest dealers of the CDS market include the Bank of America, Merrill Lynch, Barclays, BNP Paribas, Calyon, Citibank, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan, Morgan Stanley, Natixis, Nomura, RBS, Société Générale, UBS and UniCredit (DTCC, 2011).

					Group	America	
USD as of 03/2012	6,014	4,070	4,712	3,685	n/a	3,519	3,015
USD as of 03/2009	7,502	6,600	6,293	6,191	6,033	5,598	2,919

*Source: Own diagram with reference to Weistroffer (2010). Data of 06/2012 retrieved from 10-Q of these dealers. CDS notional amounts outstanding for bought and sold contracts. n/a stands for not available, as the 10-Q did not allow to distinguish between CDS and total credit derivatives for Barclays.*

Reporting dealers usually comprise large investment banks. The table above confirms the trend of declining activity in the large corporate and sovereign CDS market. Between 2009 and 2012, total contracts bought and sold have mostly decreased. This trend seems to continue into the foreseeable future: From the current first-quarter reports of 2012, it can be seen that apart from JP Morgan, all other banks show substantially lower exposures to credit derivatives than in the preceding quarters.

The second largest market participant type in sovereign CDS markets are banks and security firms. They account for 14% and 10% of total notional amounts outstanding in corporate and sovereign CDS markets, respectively. This group usually includes smaller commercial banks, investment banks, and security companies. They were the initial driver behind the standard CDS, as CDS allowed them to reduce their concentration of credit risk exposure on loan portfolios by transferring the risk. As a result, they were able to extend loan capabilities. Banks and security firms still use CDS for hedging and as a tool of managing their credit loan portfolios (Weistroffer, 2010).

A major difference between corporate and sovereign CDS markets with regard to the major participants is Central Counterparty Clearing (CCP), which represented up to 11% in corporate markets but only 1% in sovereign CDS markets at the end of 2011. CCPs are entities aligned between two counterparties acting as an intermediary for dealers like those already in place for the options and futures market (Markit, 2012). CCPs are becoming increasingly important in both sovereign and corporate markets and have already become one of the biggest market participants for corporate CDS contracts. Due to regulation and market participants' desire to standardise the CDS market, ISDA (2012) reports that CCPs have actively engaged in clearing and approximately USD 26 trillion have already been cleared through CCPs. The major clearinghouses include ICE Trust and ICE Clear Europe, and CME Clearing (ISDA, 2012).

Insurance companies have traditionally been large sellers of credit protection, for example, the most prominent market actors AIG, MBIA, and Ambac. According to Beinstein and Scott (2006), insurers can be separated into two distinct groups. Life insurance companies were typically on the sell-side of the market, selling protection in order to boost asset portfolio returns. The second group are monoliners and reinsurers. Their strategy was to sell protection as a source of additional revenue and also to diversify their portfolios. However, this classical strategy works only as long as losses incurred by the defaults of some entities can be compensated by receiving premia from other CDS products. In the financial crisis, the largest protection sellers AIG, MBIA and Ambac incurred large losses and almost defaulted themselves as a consequence (Weistroffer, 2010).

Hedge funds also participate in the CDS market. According to Beinstein and Starck (2006), hedge funds usually buy or sell protection in commodity and financial instruments corresponding to their overall strategies. According to JP Morgan (2006), hedge funds aim at

using CDS for convertible bond arbitrage. Since 2009, hedge funds and asset managers have been net sellers of CDS protection (Boone et al., 2010).

Other financial customers, non-financial institutions (such as corporates or governments) and special-purpose-vehicles (SPVs) only hold a small amount of notional amounts outstanding, particularly in the sovereign CDS market. This is evidence that CDS markets are primarily used by financial institutions rather than corporate or governmental organisations.

The strong market activity in Eurozone sovereign CDS over the last few years raises the question who the most important market participants in this market were and how their structure changed over time. The developments of the gross notional amounts held by the above-discussed participants for corporate and sovereign reference entities are illustrated in Table 7.

Table 7 – Market Participants Exposure to Global Sovereign CDS and Corporate CDS

		H1-2007	H2-2007	H1-2008	H2-2008	H1-2009	H2-2009	H1-2010	H2-2010	H1-2011	H2-2011
Reporting dealers	Sovereign	82,18%	86,04%	83,63%	85,36%	82,88%	84,87%	85,07%	87,26%	80,23%	83,52%
	Corporate	70,83%	71,29%	73,43%	74,97%	69,58%	70,30%	68,31%	66,41%	65,29%	67,91%
Central counterparties	Sovereign	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	1,31%	0,09%	2,06%
	Corporate	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	7,01%	10,61%	11,70%	12,69%
Banks and security firms	Sovereign	9,54%	12,84%	17,25%	21,20%	24,53%	22,35%	22,30%	18,50%	25,07%	16,54%
	Corporate	14,74%	15,52%	15,03%	16,79%	19,87%	19,57%	16,89%	16,11%	11,63%	7,26%
Insurance & financial guaranty firms	Sovereign	0,23%	0,46%	0,25%	0,22%	0,17%	0,12%	0,24%	0,26%	0,61%	0,57%
	Corporate	0,51%	0,55%	0,45%	0,61%	0,72%	0,69%	0,62%	0,63%	0,73%	0,66%
SPVs, SPCs or SPEs	Sovereign	0,10%	0,02%	0,01%	0,02%	0,02%	0,73%	0,21%	0,12%	0,97%	0,69%
	Corporate	0,16%	0,13%	0,12%	0,24%	0,21%	0,29%	1,21%	0,87%	1,07%	0,92%
Hedge funds	Sovereign	1,22%	0,92%	0,41%	0,75%	0,36%	0,48%	2,38%	2,26%	6,13%	5,90%
	Corporate	0,34%	0,42%	0,43%	0,31%	0,22%	0,18%	1,35%	1,37%	1,72%	1,60%
Other financial customers	Sovereign	17,30%	11,64%	11,92%	6,08%	5,76%	3,89%	2,26%	2,81%	5,04%	6,20%
	Corporate	12,14%	11,33%	9,55%	6,34%	6,64%	5,78%	2,74%	3,29%	2,54%	2,61%
Non-financial institutions	Sovereign	2,79%	1,99%	2,10%	0,73%	2,67%	2,25%	1,49%	0,58%	0,87%	0,72%
	Corporate	1,29%	0,76%	1,00%	0,74%	2,75%	3,18%	1,86%	0,70%	0,46%	0,42%

Source: Own calculations with data from DTCC (2012).

The market share of the different market participants has clearly changed over the course of the financial and subsequent Eurozone debt crisis. The market share of reporting dealers on the sovereign CDS market increased from 82.2% in 2007 to over 87.3% by the end of 2010, with slight variations in-between. Reporting dealers' share in the corporate CDS market was more subdued, varying between 70.8% at the beginning of 2007 and 67.9% at the end of 2011 with a peak of 75% in 2008. Central counterpartys' market share sprang into life in 2010 and reached 10.6% in the corporate CDS market and 1.3% in the sovereign market.

The largest changes in market share are displayed by banks and security firms on the sovereign CDS market. It increased from 9.5% at the beginning of 2007 to a maximum of 24.5% in 2009 and decreased to 16.5% at the end of 2011. The share in the corporate CDS market taken by banks and security firms also increased between 2007 and 2009 and decreased later on, but on a slightly more subdued level (ranging between 15% and 20%). A further interesting observation relates to hedge funds which accounted for only 1.2% in the sovereign CDS market in 2007 but increased their market share to 5.9% at the end of 2011. This observation corresponds to the anecdotal evidence that they have been a major factor in

speculative trading during the European debt crisis (Mengle, 2010). Hedge funds also strongly increased their market share in the corporate CDS market from 0.3% in 2007 to 1.6% in 2011.

The strongest decreases in market share over the time period considered is shown by other financial customers. While they held a market share of 17.3% in the sovereign CDS market at the beginning of 2007, this was reduced to 2.8% at the end of 2010 with a slight increase to 6.2% in 2011. On the corporate CDS market, the share decreased from 12.1% to 2.6%. The original traders of CDS, using this instrument in order to reduce own credit risk exposure and raise lending capacity, hence seem to have withdrawn from this market over the last few years. Also non-financial institutions appear to have withheld from the CDS markets with their shares dropping from 2.8% in the sovereign CDS market and 1.3% in the corporate CDS market in 2007 to 0.7% and 0.4% in 2011, respectively.

Particularly the changes in the shares of the sovereign CDS market appear interesting. To investigate this development in more detail, Table 8 reproduces the results of a study undertaken by the DTCC (2012) for the period of March 20 to June 16, 2012. It provides evidence on the market participants' activities on Eurozone sovereign CDS trading with government debtors as reference entities.

Table 8 – Trading Sovereign CDS Amounts

	Avg. Daily Notional	Total Number of Dealers	Avg. Monthly Dealers	Avg. Trades / Day
ITALY	1.200.000.000	16	15.0	65
SPAIN	975.000.000	16	15.3	75
FRANCE	950.000.000	15	14.0	58
GERMANY	550.000.000	14	13.3	31
PORTUGAL	225.000.000	16	15.7	19
IRELAND	200.000.000	15	14.3	18
BELGIUM	150.000.000	16	14.7	10
NETHERLANDS	150.000.000	16	14.0	10
AUSTRIA	125.000.000	16	14.3	7
FINLAND	50.000.000	15	12.3	2

*Source: Own diagram covering the period from March 2012 to June 2012. Gross notional amounts outstanding and net notional amounts outstanding converted to USD with Exchange Rate as of June 19<sup>th</sup>. Notional amounts data retrieved from DTCC (2012) as of June 30 2012. Greece was excluded from this survey, due to the referencing entities default in March 2012.*

As can be seen from the table, activity with regard to the number of market participants has been consistently high over the three months in 2012 which shows both in the total number of dealers and the average monthly number of dealers. The survey provides even more detailed evidence that all of the major reporting dealers<sup>20</sup> are participating actively on the sovereign CDS market. The average number of trades per day and the average size of the daily notionals outstanding have been particularly high for Italy (USD 1.2 billion over 65 trades), Spain (USD 0.98 billion over 75 trades) and France (USD 0.95 billion over 58 trades).

## Economic Uses, Benefits and Costs of CDS

<sup>20</sup> The dealers that took part in this analysis were Bank of America Merrill Lynch, Barclays, BNP Paribas, Calyon, Citibank, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JPMorgan, Morgan Stanley, Natixis, Nomura, Royal Bank of Scotland, Societ  G n rale, UBS and UniCredit.



The changes in the market shares between different market participants over the arguably extreme market situation of the financial and European debt crisis has shown that the uses of CDS products are very diverse. The primary purpose of CDS contracts was as “a means of hedging and diversifying credit risks similar to those already used for interest rate and currency risks” (ISDA, 2012). This original function of CDS contracts changed when the liquidity for credit risk increased so that trading purposes moved into the forefront of investors’ attention. A market survey by Fitch Ratings (2009) supports that the main purpose of CDS contracts remains as an instrument to insure against the possible default of a reference obligation, however, the survey clearly indicates that CDSs are also commonly used for trading and market making, as an alternative asset class and to manage regulatory capital (Fitch Ratings, 2009).

### ***Hedging / Credit Risk Management***

Hedging refers to the attempt to reduce or eliminate the risk of a loss in value of a position due to an adverse price shift. The hedging strategy usually employs taking an offsetting position. For large commercial and investment banks that hold large government bond positions, hedging is used as a risk-management tool to mitigate credit risk exposures. This is done by offsetting the current position by either buying or selling CDS, i.e., when the bank has bought a CDS it has to sell CDS with the same contractual details to offset the transaction (Deutsche Bank, 2012).

In addition, CDS are also used as a means to mitigate credit risk in the banks’ balance sheet because they lower the required reserve due to regulation. It is possible for banks to specifically transfer certain risks away and lower the required capital reserve required by regulation (Blundell-Wignall and Atkinson, 2010). Hence, by buying CDS protection, the credit risk of the reference entity is replaced with the risk of the CDS counterparty failing, which is usually lower.

### ***Trading Credit Risk***

The corporate and recently the sovereign CDS market have become sizeable markets for the trade of CDS. Trading CDS is comparatively simple compared to other products as CDS do not require any funding (Weistroffer, 2010). Protection sellers are not required to hold any capital on their balance sheet as a risk buffer. CDS are thus commonly used as a way to trade credit risk and enhance portfolio returns.

Arbitrage trading is also a common use of CDS. With this strategy, market participants try to exploit short-term price discrepancies between two markets, in this case the bond and CDS markets, to generate risk-free profits. The price discrepancy between CDS and bond markets is referred to as the cash-CDS basis. The cash-CDS basis is defined as the spread of the CDS minus the bond credit spread. When the cash-CDS basis is significantly positive or negative then market participants can execute positive or negative basis trades.

Differences in expectations on the creditworthiness of an entity can also be exploited with CDS. This strategy tends to be employed by hedge funds who buy CDS protection on a reference entity without having exposure to the underlying government bond, for instance. Basically, market participants who use this strategy speculate on the deterioration of the credit quality of the reference entity: Because CDS products are marked to market, a profit or loss occurs not only when a credit event is triggered but also when the price of the CDS increases or decreases. Hence, going long the CDS is similar to shorting the underlying sovereign bond

because the CDS's market value changes with the credit quality of the reference entity (Delatte, 2012; Delatte, Gex and Villavicencio, 2010). This speculative usage of CDS was one of the issues that raised severe concerns during the European debt crisis. Many government officials accused banks and hedge funds of exacerbating the debt crisis using naked positions on government debt and thus worsening the financial distress of the sovereign country.<sup>21</sup> The way in which trading in CDS markets can feed back into the costs of the underlying debt obligations will be outlined in the next paragraph.

### ***Information Content / Credit Quality***

With developing CDS markets, the primary purpose of a CDS as a hedging tool evolved as well. Financial markets today perceive a CDS as an instrument that provides information on a reference entity's credit quality and thus serves a "valuable signalling function" (ISDA, 2012). According to Armin Ruis, Co-Head of Fixed Income at Markit, the CDS market is even "viewed as the barometer of health for the broad credit markets" (Chick, 2009). A higher CDS spread hence implies a higher default risk of the respective reference entity. This information function of CDS originates from banks' hedging and trading actions (Francis et al., 2002): With intimate knowledge of lending institutions about the default risk of their borrowers, an increasing CDS spread may easily be interpreted as an urgent need of the lending banks to hedge their risk exposures with regard to this reference entity. Increasing spread levels are then a signal of a higher demand for protection against default, as banks perceive a higher risk of these loans.

In comparison to credit ratings, which are also used as a measure of credit quality, many investors perceive CDS spreads to provide a "timelier and more accurate assessment of credit conditions than rating agencies" (ICE, 2010). This is because ratings tend to be slow to change, view credit risk on a "through-the-cycle" basis and the potential rating inflation effect that may be due to the fact that rating agencies are usually paid by the bond issuers and hence may cater to their wishes. CDS, in contrast, are traded continuously in the market and can therefore provide a real-time indication of the markets' perception on a reference entity's credit quality. Furthermore, Blanco et al. (2004) argue that CDS reflect changes in credit risk also more accurately and quickly than bond spreads.

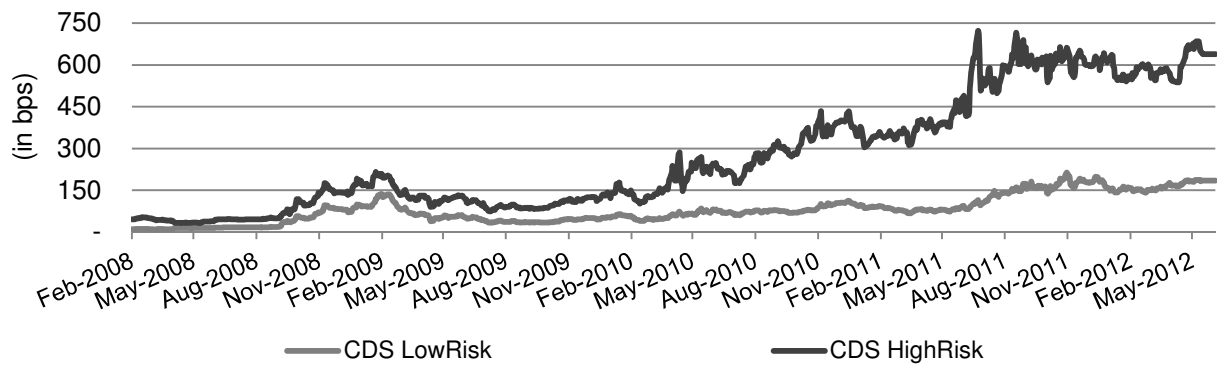
Figure 11 illustrates the development of the CDS spreads of the two synthetic indices that we created of European sovereign CDS. ABGFFN refers to the CDS index of the low-risk countries (Austria, Belgium, Germany, Finland, France, and the Netherlands) with the spread displayed in blue, PIIS to the high-risk countries (Italy, Spain, Portugal, and Ireland)<sup>22</sup> with the spread displayed in red. Both indices are equally weighted; Figure 11 shows the 10-year spreads.

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<sup>21</sup> This will be further discussed in chapter 3.4.

<sup>22</sup> Due to the exacerbated 10-year spread for Greece after the first fiscal problems arose in 2010, Greece is excluded.

Figure 11 – 10-year CDS Spreads High Risk Countries – Low Risk Countries



Source: Own diagram and calculations.

As can be seen from Figure 11, spread levels for both indices are relatively low and constant before September 15, 2008. Following the bankruptcy filing of Lehman Brothers, spread levels increased for both indices, exceeding 50 bps and 100 bps on October 23 2010, respectively. Also, the development of the low-risk and the high-risk index start to diverge quite strongly after this particular event, i.e. the CDS spreads of high-risk countries increased more strongly than the CDS spreads of less risky European countries. With the beginning of the European debt crisis markets in late 2009, the difference in spreads between the PIIS and the ABGFFN index increased even more strongly, reaching a maximum of 608 basis points in July 2011. The spread of the high-risk index also reached its peak in July 2011 at a level of 710 bps.

Even though this development is generally seen as the consequence of the declining credit quality of the respective sovereign entities, corresponding to our earlier discussion of the information function of CDS products, CDS spreads also reflect further aspects such as liquidity or the market's "risk-appetite". For sovereign CDS, the information function also appears to be smaller than for corporate CDS (Palladini and Portes, 2011). This is basically due to the fact that the information asymmetry between market participants is smaller with regard to the quality of sovereign debt as on this specific type of credit risk more information is publicly available. For corporate entities, information is less often common knowledge and also tends to become public less timely.

### Market Criticism, Regulation and Standardisation

Due to the OTC nature of CDS markets, CDS products have not been subject to many regulatory actions until recently. However, several market-initiated activities have led to a standardisation of contract definitions that helped CDS markets to evolve further. These measures have been critical for the success of this market.

After the onset of the financial crisis, several concerns regarding the operations of the corporate and sovereign CDS market have been raised. The European Commission argued that it would be necessary to implement stricter regulations as the crisis made evident substantial, hitherto undetected perils of this market. The most important among these are counterparty risk and the lack of transparency. In order to mitigate them, the regulation has to enhance transparency, supervision, stability, responsibility, and protection for the derivatives market (European Central Bank, 2009).

These standardisation efforts and regulatory changes that have and will affect the market for CDS products will be addressed in the following section.

## Standardisation

One of the most significant influencing factor of the CDS market has been the standardisation of the CDS documentation. The first standardisation agreement was the so-called Master Agreement of 1999 by the ISDA (Weistroffer, 2010, p. 21). For the first time, an agreement provided market participants with standardised definitions of what constitutes a credit event and the subsequent settlement procedures. With increased usage of CDS, amendments to the existing master agreement were published in 2003. The most recent changes in the definitions were implemented via the so-called big-bang protocol and small-bang protocol in 2009 (ICE, 2010). Both protocols are supplementary documents to the above mentioned ISDA master agreements and incorporate new standardisations. According to ICE (2010), the most significant changes in the big bang protocol are the incorporation of standard coupons, coupon dates and the hardwiring of credit event auctions. As the big-bang protocol only covers North American contracts, the small-bang protocol was introduced for European markets (Markit, 2009). As this paper focuses on the Eurozone CDS market, the small-bang protocol shall be briefly discussed in the following.

One of the most important standardisations pertains to the quoting conventions and standardised coupon rates. Since June 20, 2009, European corporate CDS trade with fixed coupons of 25, 100, 500, and 1000 basis points. In contrast, CDS referencing sovereign debt have quotes of 25 or 100bps. According to Markit (2009), European sovereign CDS trade most commonly with 25 bps for entities with tighter spreads and with 100 bps for those with higher spreads. This standardisation allows the upfront payments to be minimised as this is used to balance the difference between the quoted spread and the running spread.

Similarly, standardised coupon dates (IMM, International Monetary Market, dates, the four yearly dates that most future and option contracts use as scheduled maturity or termination date) have been introduced with the small-bang protocol as well. With the introduction of the small-bang protocol, however, European contracts now have standardised coupon dates on March 20<sup>th</sup>, June 20<sup>th</sup>, September 20<sup>th</sup>, and December 20<sup>th</sup> for any given year (Markit, 2009).

The CDS small-bang protocol also incorporates a standardised settlement procedure. Credit event auctions are introduced to provide the market with an efficient and standardised means of determining the final price of defaulted reference obligations. In this context, the Determinations Committee (DC) was formed and empowered to decide whether a settlement auction were to be held for restructuring events. Furthermore, the DC was specified as the authority that determines whether a restructuring event has occurred. Nevertheless, for restructuring events to apply, market participants still need to trigger their contracts as well. With this change, the determination by the DC increases the transparency and credibility of auction settlements (ICE, 2010).

## Counterparty Risk

In accordance with further standardisation of contracts, as of March 11, 2009, the majority of European dealers<sup>23</sup> have agreed on trading index- and single-name CDS through a European central clearing party (CCP). With the further standardisation of CDS contracts, the ability to trade CDS through a CCP was enhanced (Markit, 2009). This came partly at the demand of market participants but also at the request of regulators who tried to mitigate the

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<sup>23</sup> These are Barclays Capital, Citigroup Global Markets, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JP Morgan Chase, Morgan Stanley, UBS, and Nomura International (European Commission, 2009)

counterparty risk that emerged during the financial crisis (European Commission, 2010). Clearing through CCPs has already become a relevant market feature as our discussion on market participants in Section 3.2 has shown. CCPs have shown a significant activity for corporate CDS transactions. Even though they still play only a minor role for sovereign CDS markets, this may be expected to change within the next few years.

Another measure extensively used by market participants were trade compressions. These were mostly applied bilaterally between dealers after the collapse of Lehman Brothers to mitigate the outstanding notional amounts of dealers. According to Duquerroy et al. (2009), TriOptima, the leader in compression services, reduced over 30.2 trillion USD of CDS contracts in 2008. However, because of the lack of standardised procedures, market observers remain sceptical towards the future success of this service (Duquerroy et al., 2009).

### **Lack of Transparency**

Due to the fact that CDS are OTC products, the lack of transparency on this market has been criticised early on. In combination with the signalling function of CDS spreads regarding the credit quality of the reference entities, concerns of market manipulation with ensuing destabilising effects on government and corporate bond markets have been raised. Particularly during the Eurozone debt crisis, the trading activities in European sovereign CDS markets were thought to have increased government bond yields for several Eurozone countries. However, there has so far been hardly any evidence of a causal relation between CDS spreads and bond yields stemming from a signalling function of CDS markets (Amadei et al, 2011; IMF, 2010).

Nevertheless, the fierce discussion of intransparency of CDS markets led to one of the most controversial and critical regulation for European CDS markets—the banning of naked CDS transactions. This regulation has been introduced for the Eurozone in November 2012 (Delatte et al., 2012). Its proclaimed objective is to put an end to rising bond yields, which – purportedly – have been caused by the operations on the sovereign CDS markets in Eurozone countries in late 2009 and early 2010. The regulation prohibits trade of sovereign CDS contracts if the market participants do not hold the underlying government bond as well. Even though this regulation has only been applied from November 2012 on, it has already ignited a heated debate.

Particularly the fact that the regulation is imposed on all market participants except for those providing market making or acting as primary dealers has been strongly criticized (Ashurst, 2012). Given that the majority of market participants are reporting dealers, who are likely to be considered as market-makers and thus exempt from this rule, it is questionable whether the regulation is able to work efficiently. Further, it is likely that the reporting dealers, who are often investment banks, have proprietary trading desks that possibly trade in exactly the products meant to be excluded by this regulation. Regulators would then not be able to differentiate between both activities, let alone prohibit one (Delatte et al., 2012).

If on the other hand the regulation has an effect on markets, Stulz (2010) argues that this would result in a substantial liquidity reduction of the CDS market. He explains that a large part of liquidity comes from market participants that are not considered market-makers. These participants will not be able to execute proper hedging strategies because they will be restricted from buying CDS protection without owning the underlying exposure. The result may lead to the exit of the participants.

A reduction in liquidity would also have other undesirable effects such as a reduction in the information quality of CDS spreads, leading to a lower ability of market participants to hedge positions efficiently. Proxy hedging strategies are commonly used as a way of hedging positions that are closely correlated with the reference entity of a CDS. Stulz (2010) even warns that with a decrease in liquidity, a decreasing ability to hedge positions efficiently and the exit of market participants, the entire CDS market could collapse.

In a similar argument, Boehmer et al. (2011) and Duffie (2010) explain that a decrease in liquidity might lead to a higher information asymmetry between market participants with adverse effects particularly on government bond markets. Stulz (2010), Duffie (2009) and Amadei (2011) furthermore argue that higher information asymmetries and lower liquidity could induce market participants to substitute naked CDS transactions with other products such as outright short sales. As short sales are an instrument that can easily destabilise the reference entities, this would achieve the opposite of the aspired effect from the regulators' perspective, increasing volatility and spread levels.

Ratings announced by credit rating agencies perform a similar information function as CDS spreads, with similar consequences for the stability of the referenced entities. Particularly after the onset of the European debt crisis, credit rating agencies have been strongly criticised for the often late and – then – large rating changes. As a consequence, rating agencies have placed a lot of effort on assessing the credit risk particularly of the high-risk PIIGS countries (Portugal, Italy, Ireland, Greece and Spain). While earlier studies had already confirmed a substantial impact of negative rating changes on corporate CDS spreads (Hull et al., 2004; Micu, 2004), the question whether rating events may indeed feed back into the yield on government bonds and on sovereign CDS spreads is relatively recent to the academic literature.

In this respect Afonso et al. (2011) examine the impact of rating announcements on Eurozone sovereign CDS by Standard & Poor's, Moody's Investor Services and Fitch Ratings. Their results indicate that rating announcements have a significant effect on both bond spreads as well as CDS spreads. Interestingly, the most significant effects are caused by negative rating announcements from Standard & Poors, followed by negative announcements from Moody's. Positive rating changes, in contrast, show only a significant effect on bond spreads if announced by Moody's and Eurozone CDS spreads are not affected at all. Regarding the causality of these effects, Afonso et al. (2011) reports that rating changes and rating outlooks are not anticipated by Eurozone sovereign CDS markets within a time interval of 1-2 months before the occurrence of a rating event, but in a shorter period of 1-2 weeks. Ratings and both bond and CDS spread changes share a bi-directional Granger Causality. Eijffinger et al. (2011) come to a different conclusion. They argue that for European sovereign CDS markets, rating agencies lag behind in their assessment and that CDS incorporate changes in credit quality much more timely. The evidence on whether credit ratings can contribute to a higher precision of information on default risk, thus alleviating CDS spreads from their information function and the related problems, is hence inconclusive.

## **Conclusion and Discussion**

This paper provides an overview of the function and development of sovereign and corporate credit default swaps and enhances the understanding of this increasingly important financial contract. It contributes to the on-going research on corporate and sovereign CDS markets by focussing particularly on the European CDS market and highlighting the differences between corporate and sovereign CDS.

With regard to contract characteristics, particularly contract size and maturities differ between corporate and sovereign CDS. Differences in the legal documentation of CDS contracts show mostly in the definition of credit events. Furthermore, the use of CDS contracts has shifted from their original purpose as specific credit-risk hedging tools towards more general means of risk trading. Our review also demonstrates that CDS contracts (respectively CDS spreads) have become one of the leading indicators of corporate and sovereign entities' credit quality.

The overview and analysis of the development of the corporate and sovereign CDS market has mainly focused on the Eurozone markets. While the Eurozone sovereign CDS market was relatively small in comparison to the corporate CDS market in 2007, this has changed tremendously over the last few years. After the onset of the subprime crisis and the default of Lehman Brothers in 2008 and, particularly, the beginning of the European debt crisis in late 2009, volumes and trading activities have increased sharply. Liquidity in the Eurozone sovereign CDS market has reached unprecedented levels, while the market for corporate CDS has decreased during the crisis years. The main motivation behind the strong activity on sovereign CDS markets appears to be the trading motive rather than the hedging motive, however. Paralleling this process has been the introduction of both more standardisation and regulation to CDS markets. Especially the adoption of the small-bang protocol has contributed to more transparency and stability on European CDS markets.

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