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„The Relationship between Credit Default Swaps and Credit
Ratings for Sovereigns“

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Abstract

This paper carries out an event study analysis on the relationship between credit default swap (CDS) spreads and credit ratings for sovereigns in the context of European debt crisis. The empirical analysis also investigates this relation with a special concern for PIIGS countries and a concern for Eurozone countries. Main findings show: PIIGS countries are affected and suffered more from the outcome of financial crisis among other European countries. The period of European debt crisis explains significantly the negative correlation of CDS spreads and credit ratings, particularly the stronger impact of negative events on CDS spread changes.

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List of Abbreviations

CCP	Central Counterparties
CDS	Credit Default Swap
CRA	Credit Rating Agency
ECB	European Central Bank
EMU	European Monetary Union
EU	European Union
GDP	Gross Domestic Product
GNI	Gross National Income
IMF	International Monetary Fund
IOSCO	The Board of the International Organization of Securities Commissions
ISDA	International Swaps and Derivatives Association
NASD	National Association of Securities Dealers
OLS	Ordinary Least Squares
OTC	Over The Counter
PIIGS	Portugal Ireland Italy Greece Spain
PPP	Purchasing Power Parity
SEC	Securities and Exchange Commission
TRACE	Trade Reporting and Compliance Engine
US	The United States of America
USD	United States/American Dollar
WDI	World Development Indicators

1. Introduction

The global financial crisis of 2007-2010 is the major turbulence of recent global economy. It has begun with liquidity issue in banking system in 2007, which has signaled forthcoming US subprime mortgage crisis. Then, the extent of growing fear of loan defaults has reached to global levels. As the global financial system has become vulnerable, the world economy experienced aggregate shocks and simultaneous failures of major financial entities. Especially the collapse of Lehman Brothers on 15 September 2008 triggered a domino effect resulting in huge losses for many financial entities and threatening the world's advanced economies. The governments found the remedy for saving private sector from collapse in introduction of financial rescue packages. However, this action of governments has resulted in a severe debt crisis for sovereigns after then.

The need of more efficient risk management within financial systems has become an important issue in the past decade. As credit derivatives has attracted a great attention being efficient risk allocators in this period, among others credit defaults swaps became the most common and the most widely traded type of credit derivatives. Since the beginning of the global financial crisis, CDS spreads have risen sharply all along the line and CDS market has significantly expanded. With the response of governments in 2008, the risk is transferred from banks to sovereigns. As the sovereign debts have reached to record high levels, CDS has become an important key financial instrument for sovereign debt markets by trading more frequently.

As in the relevant literature has been pointed out by many researchers that both CDS and bond spreads are the reflectors of the market's perception of risk, it is significant that CDS spreads reveals the related information in a faster and more efficient way than bond spreads. Especially for sovereign market, sovereign CDS data is more advantageous compared to sovereign bond data, because sovereign CDS market is more liquid and signals more accurate and immediate information about credit risk. This nature of sovereign CDS spreads makes them reliable indicator of market.

1.1. Research Question

This study tries to find an answer to the question:

“What is the relationship between credit default swaps and credit ratings for sovereigns?”

I collected sovereign CDS spreads and corresponding sovereign credit ratings for the years between 2004 and 2010 for twenty-three EU countries. In order to examine the relationship of two data sets with different concerns, this paper applies a standard event study methodology and tries to make a meaningful explanation to the respond of CDS spreads to the changes in the credit ratings. In addition, I also tried to develop an understanding on the influence of the relevant macroeconomic determinants on sovereign credit ratings. In particular, I tried to address the following questions:

1. Can we find a significant explanation on which development indicators have influence on sovereign debt ratings? Can we expect to observe a significant result concerning both PIIGS countries and the crisis period?
2. Can we reach a reliable correlation between the changes in credit ratings and the changes in CDS spreads, if we focus on a time window of one day before and one day after a rating event? Is there a difference whether it is a positive event or a negative event?
3. Can we find a significant explanation for the effects of sovereign credit ratings on CDS spreads? Can we expect to observe a more significant result for PIIGS countries in this concept?
4. Can we measure the response of CDS spreads for PIIGS countries and Eurozone countries separately? Can we have an opinion if PIIGS countries spreads dominate the Eurozone average?

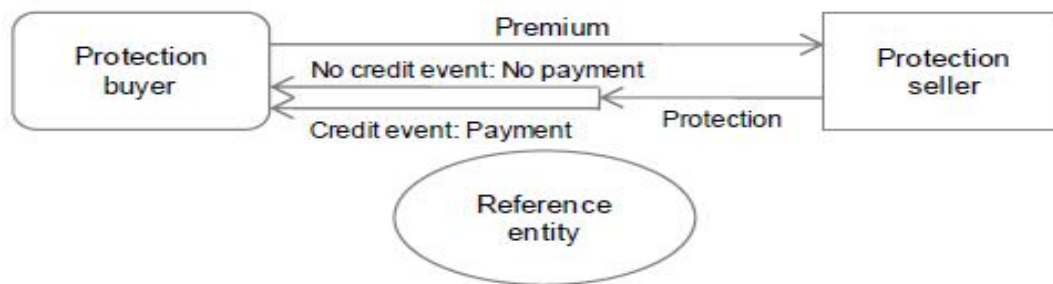
As I try to have an empirical approach to these questions, the remaining part of the study represents some valuable information referencing precious studies in the relevant literature and using recent data to shed a light on the numerical values. Section 2 reviews briefly very important issues about CDSs, take a glance at the CDS market, particularly at sovereign CDS market and recent developments. Section 3 presents some important findings from the several relevant literatures over the impact of ratings on both CDS market and bond market. Section 4 gives some basic information about functions of CRAs as well as their rating systems. Section 5 explains which data sets I cover in this study; their resources and period, including determinants influence sovereign ratings. Section 6 discusses the methodology and presents the results and main findings of our empirical investigation. Finally, Section 7 concludes the study.

2. Credit Default Swaps

2.1. Definition

*"A CDS is a contractual agreement that transfers the default risk of one or more reference entities from one party to the other. One party, **the protection buyer**, pays a periodic fee to the other party, **the protection seller**, during the term of the CDS. If the **reference entity** defaults or declares bankruptcy or another credit event occurs, the protection seller is obligated to compensate the protection buyer for the loss by means of a specified settlement procedure. The protection buyer is entitled to protection on a specified face value, referred to as the notional amount, of reference entity debt."¹*

Figure 1 : How Does a CDS Work?



Source: Weistroffer (2009, p.4), Deutsche Bank Research

Basically, a credit default swap (CDS) is not a security, or does not convey ownership of underlying asset, or does not raise cash. It is a financial instrument which is used to shift risk of a reference entity (corporate or sovereign) from one market participant to another.² This instrument is a form of insurance on a bond that the protection buyer of the CDS contract wishes to buy insurance against the possible default on this bond issued by a particular company or country.³

¹ ISDA, CDS Marketplace (2012), How Credit Default Swaps Work?.

² O'Kane and Turnbull (2003, p. 1).

³ Daniels and Jensen (2005, p. 18).

If the reference entity faces with a credit event, then the protection seller is obligated to compensate the protection buyer for the loss as a consequence of the CDS contract. A **credit event** varies according to the type of reference entity.⁴ The International Swaps and Derivatives Association (ISDA) defines a credit event for a sovereign issuer as obligation acceleration, failure to pay, restructuring or repudiation/ moratorium.⁵ In contrast to corporate CDSs, bankruptcy is not a credit event for sovereign CDSs, because of impossibility for a court which to judge a sovereign bankruptcy case.⁶ For (Western European) sovereigns, the case of bankruptcy is replaced by repudiation /moratorium.⁷ By the definition of ISDA, *“repudiation or moratorium provides for compensation after specified actions of a government reference entity”*⁸, which means that a credit event can be triggered if a government repudiates (refuses) its debt or declares a moratorium (delay) on its debt payments.

In a typical bond contract, the buyer (investor) is exposed to credit risk. In a good state, the seller (issuer) of the bond pays all interest and returns principal and in a bad state, he defaults and cannot pay all interest and bondholder’s principal. This resultant loss is funded by the investor (buyer) of the bond. An investor may wish either to sell a risky bond prior to the exposure or buy a CDS, when he believes that the associated credit risk will rise. Under some circumstances, investors, who still want to keep those risky securities, may use CDSs to eliminate or reduce their exposure to the credit risk. As CDS can be a convenient risk management tool, CDS buyer’s aim is to transfer the credit risk as CDS seller’s aim to receive premium income. When entering the contract, the protection buyer and seller agree upon a periodic payment, namely **CDS premium or spread**, *“which generally remains constant until the contract matures and which compensates the protection seller for bearing the risk of default”*.⁹

⁴ Mengle (2007, p. 3).

⁵ Dieckmann and Plank (2011, p. 6).

⁶ European Central Bank (2009, p. 68).

⁷ Credit Suisse (2010, p. 5).

⁸ ISDA, CDS Marketplace (2012), About CDS:CDS FAQ.

⁹ Weistroffer (2009, p. 4), Deutsche Bank Research.

Credit default swaps are quoted in basis points per year. The CDS premium is calculated on an annual basis, but it is usually paid in quarterly terms. As an example, a protection buyer of a CDS contract with notional value of USD 10,000,000 and an agreed premium of 100 basis points has to pay a quarterly amount of USD 25,000 to insure his investment against default of the reference entity.¹⁰ As seen in the example, 1 basis point translates into 100 unit, regardless of currency.

A CDS contract either simply expires at maturity or a credit event occurs between the ongoing premium payments, whichever comes first. At the time of default, the termination of the contract due to a credit event triggers a compensation payment.¹¹ Usually CDS contracts are settled according to the protection buyer and seller's agreement up-front. In the event of default by the reference entity, a CDS settlement can be settled either with a **physical settlement** (delivery of reference obligation), in which case the protection buyer delivers the reference obligation to the seller and in return receives the full notional amount of the CDS contract from the seller, or with a **cash settlement** (transferring of cash), in which case the buyer keeps the underlying bond but is compensated by the seller for the loss incurred by the credit event.¹² The cash settlement amount that the CDS buyer receives is the difference between the bond's nominal value and the value at time of settlement in cash.¹³ If there is no credit event during the life of the contract, the CDS premiums are likely to be the only cash flows exchanged.¹⁴

2.2. Credit Risk, Counterparty Risk and Systemic Risk

The probability of a default on an obligation reveals a credit risk. **Default/credit risk** is the potential that a counterparty will fail to meet its obligations.¹⁵ The risk between a protection buyer and a protection seller is called as the **counterparty risk**.¹⁶ One of the

¹⁰ Example including its values taken from Weistroffer (2009, p. 4), explaining CDS premium.

¹¹ Daniels and Jensen (2005, p. 18).

¹² Daniels and Jensen (2005, p. 18).

¹³ Weistroffer (2009, p. 4) , Deutsche Bank Research.

¹⁴ Criado et al. (2010, p. 8).

¹⁵ European Central Bank (2009, p. 20).

¹⁶ Daniels and Jensen (2005, p. 18).

main concerns regarding the functioning of the CDS market is related to the counterparty risk generated by the default of large protection sellers due to the market's highly interconnected and concentrated trading nature.¹⁷ The CDS market is concentrated around a few large players, namely J.P. Morgan, Morgan Stanley, the Goldman Sachs Group, Deutsche Bank and the Barclays Group.¹⁸ As a nature of CDS contracts, offsetting trade is the most preferred way by dealers in order to terminate economic exposure related to the reference entity.¹⁹ The problem arises from the point that the second party can be also a dealer undertaking additional hedging transactions. In this situation, where the market participants know their direct counterparties, but not the parties further along the chain, a chain of linked exposures will arise.²⁰ Related to this, in the sovereign CDS market, a real problem is that arises because of the concentration in counterparty risk.²¹

Highly concentrated and interconnected nature of the CDS market may lead to a **systemic risk**, which is defined by Giglio (2010) as simultaneous default of multiple financial institutions. Since those large players of the market serving as counterparty as well as a reference entity, there may be a systemic effect due to credit and counterparty risk interaction. Thus, once a member of those large players fails, it becomes inevitable that the others will be affected through both counterparty and credit exposure.²² Such historical examples of major dealers in CDS market, like the bailout of AIG, and the bankruptcy of Lehman Brothers in 2008 mirror the importance of counterparty risk in the risk management of CDS.²³ As stated finely in Deutsche Bank Research, *"Had AIG not been rescued, there would have been a joint default with Lehman, which actually defaulted the weekend before AIG was rescued"*.²⁴

¹⁷ IOSCO (2012, p. 1).

¹⁸ European Central Bank (2009, p. 21).

¹⁹ IOSCO (2012, p.4).

²⁰ European Central Bank (2009, p. 37).

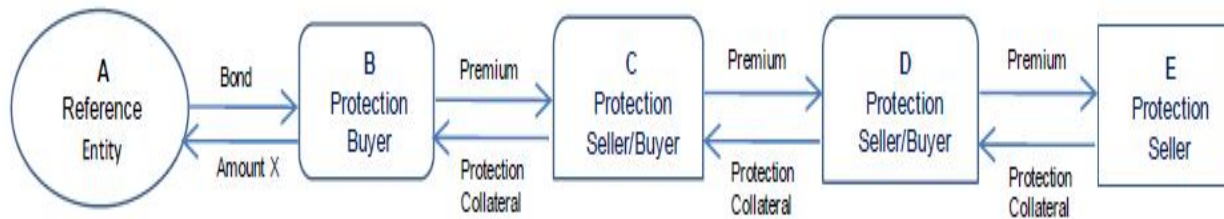
²¹ See Joseph R. Mason's statement in Duffie et al. (2010, p. 17), Hearing, 29.04.2010.

²² Weistroffer (2009, p. 14) , Deutsche Bank Research.

²³ IOSCO (2012, p. 24).

²⁴ Weistroffer (2009, p. 13) , Deutsche Bank Research.

Figure 2 : Multiple Transfer of Credit Risk



Source: Weistroffer (2009, p.14), Deutsche Bank Research

As indicated in Figure 2, assuming company B buys credit protection from dealer C against the default risk of reference entity A, seen that dealer C also hedges its exposures with dealer D by becoming its protection buyer, while D also passes on the risk to mono-line insurer E. Although three individual contracts can be counted in this case, consequently only one of the parties at the end of the risk transfer chain (either B or E) will bear the risk if the reference entity A defaults, where B and C could already hedge their risks.²⁵ Repeated transfer of credit risk may also affect counterparty risk. There are even more complex chains of risk transfer, including more contracts, that in some parts, some counterparties are not interconnected, but there may be a systemic factor, which makes the whole risk transfer matrix even more risky.

As Bouveret (2009) stated, CDS is such an instrument that is used by banking sector in order to reduce its equity requirements, but at the same time it increases systemic risk. In this context, calculation of notional amounts is all-important. **Gross notional value** is the sum of CDS contracts bought (or equivalently sold) across all counterparties, where each trade is counted at once. **Net notional value** has the same definition but this time net protection bought is evaluated at the level of individual counterparties, where protection sold will be offset by protection bought for the same reference entity.²⁶ Let's look at how these values are constructed:

²⁵ Weistroffer (2009, p. 13) , Deutsche Bank Research.

²⁶ Weistroffer (2009, p. 5) , Deutsche Bank Research.

Figure 3: Gross and Net CDS Notional					
Banks	A	B	C	D	Gross
Trade 1	12		-12		12
Trade 2		10		-10	10
Trade 3			7	-7	7
Trade 4	6	-6			6
Trade 5	25		-25		25
Trade 6		40	-40		40
Trade 7	-32		32		32
Net Positions	11	44	-38	-17	132
Source: Pollack (2011), FT Alphaville					

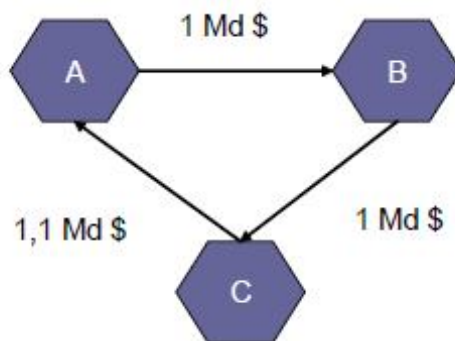
Here in Figure 3, a positive number means a buyer of CDS protection, where a negative number means a seller of CDS protection. For example, Bank A buys \$12 CDS from Bank C, hence there is \$12 of gross notional from that one trade. (Each trade is counted once, not double-counted.) Looking at all seven trades, the total gross notional in the system is \$132, but the net notional is only \$55. (By counting the net position just for the overall buyers (11+44) or just for the overall sellers (38+17).)²⁷

How systemic risk appears can be seen in Figure 4. Here, we are assuming three agents, A, B and C, which are operating in the CDS market. If the borrower (reference entity) defaults, A must pay \$1 billion to B, but will receive \$1.1 billion from C. B must pay \$1 billion to C. In this trade structure, the notional outstanding is \$3.1 billion but the net value of these CDSs is only \$100 million (Depending on the calculation explained above, protection sold will be offset by protection bought for the same reference entity.). If for some reason (for example owing to failure) agent A disappears, agents B and C are no longer covered. In the case of a credit event experienced by the reference entity, B will have a \$1 billion exposure to C. As seen in this simple presentation, in real cases one agent's failure may have an excessive effect on the systemic risk.²⁸

²⁷ Pollack (2011), FT Alphaville.

²⁸ Bouveret (2009, p. 6).

Figure 4: Systemic Risk in The CDS Market



Source: Bouveret (2009)

2.3. Contagion Risk and PIIGS Countries

High-interconnected nature of CDS market increases the potential for systemic risk and consequently financial contagion, which both weaken the financial systems. The notion, “**financial contagion**, refers to a situation whereby instability in a specific market or institution is transmitted to one or several other markets or institutions”.²⁹ Masson (1999) explains “contagion in financial markets” through macroeconomic linkages in many aspects and one very considerable is the spillover effects, which explain why a crisis spreads from one market to another through linkages of trade, economic activity, or competitiveness. These linkages are needs of modern financial systems consisting of entangled web of claims and obligations. Intermediaries of financial systems, such as banks and hedge funds, act in their own benefits through this network structure, but at the same time by tying their balance sheets in many ways of linkages, they create such an environment of interdependencies, which is vulnerable to contagion risk. The introduction of sophisticated financial products, such as credit default swaps, has heightened the complexity of financial intermediaries’ connections even further, as demonstrated by the last financial crisis.³⁰ Especially in the case of a country’s distress, countries can become so interdependent in stable as well as crisis periods that contagion is extremely difficult to stop, even it can be fatal because it can cause a

²⁹ Constâncio (2012, p. 110), Banque de France Financial Stability Review.

³⁰ Gai and Kapadia (2010, p. 5).

negative shock in one country to spread to other countries rapidly through numerous financial channels and eventually can constitute a global shock.³¹ Although several economists anticipated 2008 financial crisis, it was not easy to foresee the transmission of US subprime shock to major financial institutions as well as to the rest of the world through international channels experiencing aggregate shocks and simultaneous failures. As the main concern of this thesis is the reaction of CDS spreads for sovereigns to the changes in the country ratings, looking closer to the most riskiest countries' stories particularly all along the European sovereign debt crisis may let us catch a relevant sense with respect to the impact of contagion. An inspiring work from Afonso et al. (2011a) also focuses on the existence of these spillover effects and argues that whether sovereign yields spreads and CDS spreads in a given country also react to rating announcements for the other countries. Consistent with previous finding in the literature^{32,33}, the results show that non-event countries experience significant changes in their sovereign yields due to rating announcement spillover effects. More recently, consequences of spillover effects seem to be more concrete and the story behind triggering effect of contagion is well explained by Vice-President of the ECB, Vítor Constâncio in an article:

“When the sovereign crisis became more severe again and Moody’s downgraded Portugal on 5 July 2011, it cited – among other factors – developments in Greece. Moody’s believed that contagion from a default of Greece made it more likely that Portugal would require a second round of official financing. Moreover, referring to Greece as a precedent, Moody’s indicated that a second round of official financing would entail private sector participation also in Portugal.

Unfortunately, this was not the end of the story. The downgrade of Portugal and, above all, the continuing fears of a Greek default apparently triggered a sell-off in Spanish and Italian government bonds. There had not been adverse data releases concerning the Spanish and Italian economies or budgetary situations around that time. By 18 July

³¹ Forbes (2012, p. 1).

³² See Gande and Parsley (2005).

³³ See Ismailescu and Kazemi (2009).

*2011 Italian government bond yields had increased by almost 100 basis points, while Spanish ones had increased by more than 80 basis points.*³⁴

Around his findings in euro area CDS markets, Vítor Constâncio observes the evidence of relevant impact of contagion in a statistically significant way. In the light of this approach, this thesis also has the similar consideration estimating the extent of greatest deterioration in the sovereign CDS spreads particularly for the five countries – Portugal, Ireland, Italy, Greece and Spain (PIIGS) –. As distinct from Constâncio that analyzes the effects of the crisis for the more recent period of time (2010 – 2012) where evidence to the European debt crisis appears to be more clear, with a different concern I give a start from 2007 to analyze the effects of crisis till the end of 2010 (See Appendix 2).

2.4. Need for Centralized Clearing and Greater Transparency

After the results of the recent financial crisis, and particularly epic bailouts in finance world such as AIG, the use of **central counterparties (CCP)** has been considered as a way of mitigating counterparty risk in CDS contracts and preventing default contagion.³⁵ The CCP can be seen as a safe counterparty³⁶ which is “*acting as a buyer to every seller and a seller to every buyer of protection*”³⁷. With the introduction of centralized clearing, members manage their counterparty exposure through the CCP, instead of searching for other individual clearing members. Thus, having a CCP brings along some benefits like isolating counterparties from the default of each other which refers to counterparty risk and reducing the bilateral interconnectedness between counterparties that helps to limit the risk of contagion in the financial system, as long as the CCP has enough resources to absorb losses in the event of default by a clearing member.³⁸ In addition to that, a centralized counterparty clearinghouse also can act as a monitor to the exposures of its counterparties and prevent them from taking additional exposures.³⁹ Although CCP reduce counterparty risk for market participants, there may be an

³⁴ Constâncio (2012, p. 111), Banque de France Financial Stability Review.

³⁵ IOSCO (2012, p. 25).

³⁶ European Central Bank (2009, p. 52).

³⁷ IOSCO (2012, p. 25).

³⁸ IOSCO (2012, p. 25).

³⁹ Stulz (2009, p. 32).

important issue to underline that when there is only one or a small number of CCP, due to their nature of functioning the large concentration of risk is pulled from other participants to CCP and even for CCP there is a probable case of failure that can lead to a chaining systemic disaster.⁴⁰ For CDS trades, there are several CCP facilities around the world.

Such challenges for financial stability release the requirement of greater disclosure and transparency for both the assessment of systemic risk⁴¹ and the assessment of counterparty risk⁴². The AIG and Lehman Brothers affairs and consequently the recent financial crisis in credit markets have revealed the bilateral nature of CDS contracts⁴³ once more and most particularly the Greek event has strengthened the need for financial regulators to have a better understanding of dealers' derivatives exposures.

Lack of transparency is the issue to investors that they concern about the position in a transaction whether they are taken advantage. In contrast, such transparency about their derivatives positions would not be in the interests of financial institutions, which make it difficult to trade or to take advantage of its views on the market.⁴⁴

*“**Transparency** in this context may refer to the information available on the issuers’ terms of sale (pre-transparency), to prices and volumes of transactions carried out in the market (post-transparency) or to the available information on the positions held by each dealer, an issue which is of special relevance for the identification and assessment of potential aggregate risks”.*⁴⁵

For the purpose of transaction reporting in corporate bond market and the need of increased market transparency, a system called TRACE (Trade Reporting and Compliance Engine) is initiated by NASD on July 1, 2002⁴⁶ and all members of NASD are obligated to report transactions in corporate bonds to TRACE under a SEC

⁴⁰ IOSCO (2012, p. 25).

⁴¹ European Central Bank (2009, p. 6).

⁴² See Acharya et al. (2009).

⁴³ Avellaneda and Cont (2010, p. 16).

⁴⁴ Stulz (2009, pp. 33-34).

⁴⁵ IOSCO (2012, p. 21).

⁴⁶ Bessembinder et al. (2006, p. 252).

approved set of rules⁴⁷. However, this system could not find a huge support from market participants in EU corporate bond market, particularly in the case of sovereign CDS, because it is more difficult to adapt a system to the government bond market, which is anyway more transparent than the corporate bond market and its liquidity may get damaged by further transparency.⁴⁸ As Avellaneda and Cont (2010) argue that CDS market is much more concentrated on a small network of dealers that the increased transparency could have side effects to those large dealers. This issue has been also addressed in the report on CDS market by IOSCO that *“greater transparency may reduce information asymmetries and transaction costs, but it may also discourage dealers from providing liquidity”*⁴⁹. However, there is a trade-off for market participants between gaining a better assessment of counterparty risk and keeping their strategies confidential⁵⁰, the regulators dictate from a systemic risk management perspective that greater transparency is always required, as the crisis has demonstrated this need. Furthermore, the increased transparency may also provide benefit in the interest of investors when a stronger integration of CDSs to CCPs can be reached.⁵¹

2.5. The Economics of CDS

Credit default swaps protect investors against credit events on reference corporate or sovereign bonds. In sum, CDSs are a hedging tool with a very wide usage for many financial intermediaries such as banks and hedge funds that the beneficial usage of them explains us why the CDS market has significantly expanded in the past decade.⁵² Not solely as an insurance against risk, CDSs are preferred for many other reasons because of their economic benefits. CDSs complement traditional hedging methods as being an effective risk management tool and an in great demand trading-instrument, which led to the widespread acceptance of these instruments in the first place.⁵³

⁴⁷ See <http://www.finra.org/Industry/Compliance/MarketTransparency/TRACE/> . FINRA (Financial Industry Regulatory Authority) is the successor of NASD since 2007.

⁴⁸ Criado et al. (2010, p. 41).

⁴⁹ IOSCO (2012, p. 1).

⁵⁰ Duquerroy et al. (2009, p. 85), Banque de France Financial Stability Review.

⁵¹ See European Central Bank (2009).

⁵² Bouveret (2009, p. 1).

⁵³ Weistroffer (2009, p. 8), Deutsche Bank Research.

How sovereign CDS has become an integral part of global financial markets is explained in *Financier Worldwide Magazine's* December 2011 publishing, mentioning as of 29 October 2011, 9 of the top 10 CDS positions based on net notional amounts were sovereigns: France, Italy, Germany, Brazil, Spain, United Kingdom, China, Japan, and Mexico.⁵⁴ Compared to main CDS contract purpose, sovereign CDS contracts are traded for a number of different reasons by many different market participants. Large investors, such as banks, have large holdings of government bonds, and because of the fact that liquidity in the government bond markets is relatively low especially in some of European countries, sovereign CDSs are tended to be used often to hedge the risk arising from fluctuations in government bond trends.⁵⁵ There are several different purposes of sovereign CDS trading, such as; global banks prefer sovereign CDS protection to hedge country-specific exposures gained by doing business in those countries, risk managers of large financial institutions use sovereign CDS to hedge macroeconomic risk and asset managers use sovereign CDS protection to manage exposures to cash investments such as bonds and loans.⁵⁶

As in the literature has been argued many times (as in Di Cesare (2006)), CDS spreads can be used as a measure of credit risk and therefore CDS can be introduced as a market indicator. Looking at sovereign markets, it is seen obviously that using sovereign CDS data has an important advantage over sovereign bond data because of sovereign CDS market being more liquid and resulting in more accurate estimates of credit spreads compared to corresponding sovereign bond market.⁵⁷

⁵⁴ Ching and Telpner (2011), *Financier Worldwide Magazine*.

⁵⁵ Shino and Takahashi (2010, p. 4), *Bank of Japan Review*.

⁵⁶ Ching and Telpner (2011), *Financier Worldwide Magazine*.

⁵⁷ Longstaff et al. (2011, p. 1).

2.6. The Relation between CDS and Bond Markets

There is a close relationship between CDS and bond markets that in theory, CDS and bond spreads should be more or less equal, they should co-move in the long run. According to several different assumptions, there is a high correlation between CDS prices and bond spreads that what is expected to see in this relationship is those both spreads are linked closely. Even if there may deviations seen between the spreads of CDS and bonds, they are likely to catch up each other afterwards. The most recent analysis of these two risk evaluators both in corporate and sovereign credit markets is based on the concept of price discovery⁵⁸. As also stated in a financial stability review of Banque de France⁵⁹, CDS market plays a leading role over the bond market in the price discovery process for the whole market. After CDS inception, it is clearly observed that bond market faces with significant declines at trading volumes. According to the recent report on CDS market by IOSCO, this might be explained by the fact that some serious amount of the trading is diverted from the bond market to the CDS market and in addition to that, CDS market becomes more liquid than the underlying bond market.⁶⁰ As Duffie (2008) argues that CDSs contribute to the market by offering investors different hedging opportunities and additively they allow investors to unload their risks without a must of a change in their current positions in the underlying bond, which brings with reduced transaction costs together⁶¹. What is more important is as both CDS and bond spreads are the reflectors of the market's perception of risk, CDS spreads are doing it faster and more efficient than bond spreads. Because, unlike bond spreads, CDS prices are determined not by interest rate risk but solely by credit risk which allows more efficient credit risk management⁶². Moreover, CDS spreads reveals such unique information about the credit risk of bonds that they often signal to the market about the real quality of the underlying instrument before any price adjustment is made.⁶³

⁵⁸ See Arce et al. (2012) about the concept of price discovery.

⁵⁹ See Coudert and Gex (2010), Banque de France.

⁶⁰ IOSCO (2012, p. 33).

⁶¹ See Criado et al. (2010).

⁶² Bouveret (2009, p. 3).

⁶³ AIMA (2011, p. 5).

As the financial stability review of Banque de France focuses on the question of which market is leading and which one tends to follow the other, their results show that even the interactions between the two markets seem to be bi-directional in the long run (both markets go a bit of the way for adjusting to each other), there is an evidenced lead of the CDS market on the bond market, slightly for sovereigns, particularly for corporates because of the greater liquidity of the CDS market.⁶⁴ Regarding the start of the crisis (after Lehman Brothers' bankruptcy in September 2008), as they search for the links between two markets over the crisis period, this time their results end up a stronger lead of the CDS market for both sovereigns and corporates, evidencing by the relatively higher adjustment speed of bond market in order to close the gap tending to follow CDS market. In other words, CDS market leads the bond market in the times of financial distress. Additionally they analyze their results by splitting their sample of sovereigns by risk category and what they find out is the lead of the CDS market only holds for emerging countries with high-yields, where the government bond market still leads the CDS spreads in low-yield countries.

2.7. The Market at a Glance

Credit derivatives market has attracted important attention in the past decade. The need of risk management within financial systems and the stability of financial markets revealed them as efficient risk allocators of both individual and global economy. From the beginning of its creation, credit derivatives market has carried a simple but key role to hedge and take credit risks on corporate and sovereign debt and the market has reached an advance position in time. This rapid development of credit derivatives market was interrupted in the second half of 1997 with the Asian Crisis.⁶⁵

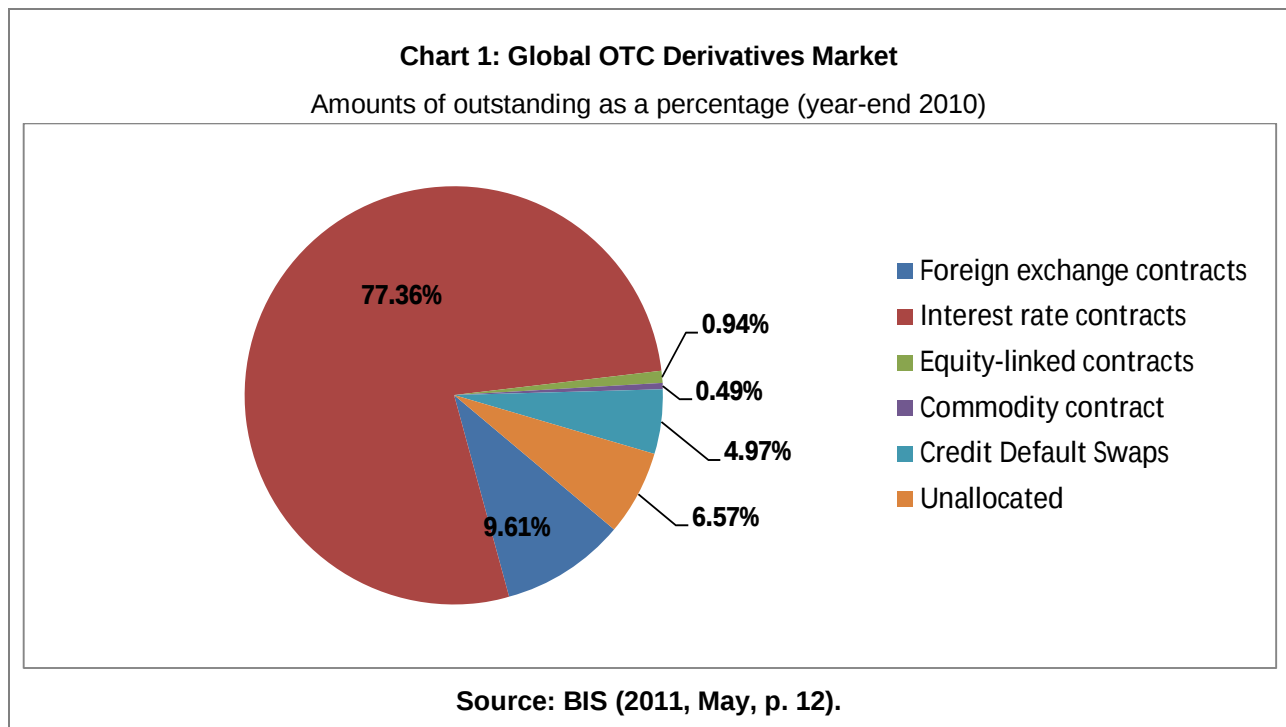
Among other derivatives, credit default swaps became the most common and the most widely traded type of credit derivative. The first CDS contract was introduced by JP Morgan in 1997 and the use of credit default swaps has become increasingly popular over time. Due to the fact that the lack of standardized documentation has slowed down

⁶⁴ Coudert and Gex (2010, pp. 165-166), Banque de France.

⁶⁵ Ranciere (2002, p. 4).

credit derivatives market's development⁶⁶ and particularly CDS market, in 1992 ISDA developed a **Master Agreement** together with related documentation applying to any OTC derivatives trades, including CDS ⁶⁷, and in 1998 developed the first version of a standardized CDS contract ⁶⁸. The Master Agreement was then revised in 2002 and after then several specifications are developed in time as a result of the growing importance of CDS and the increasing demand for contract standardization.⁶⁹

The CDS market is an Over-The-Counter (OTC) market. The OTC derivatives market is the largest market for derivatives with the total outstanding notional amount of \$601 trillion as the end of 2010.⁷⁰ Although CDS market has a high frequency of trading, with a notional amount of nearly \$30 trillion (as the end of 2010), it only has a share of almost %5 of whole OTC derivatives market among other derivatives (See Chart 1).



⁶⁶ Ranciere (2002, p.4).

⁶⁷ IOSCO (2012, p.10).

⁶⁸ O'Kane (2001, p. 61).

⁶⁹ IOSCO (2012, p.10).

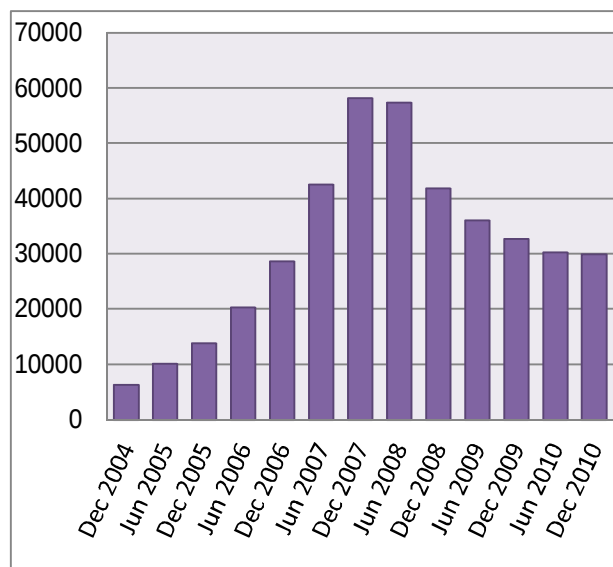
⁷⁰ BIS (2011, May, p. 5).

From the market's beginnings the notional amount of outstanding CDS has grown rapidly. According to the ISDA market survey, by year-end 2002 the notional amounts outstanding stood at over \$ 2 trillion. The market size had almost doubled each year and CDS market reached a notable amount of \$ 62.2 trillion by the end of 2007.⁷¹ Then, it declined sharply just over \$30 trillion at the end of the first half of 2010 (See Chart 2 and Table 1A).

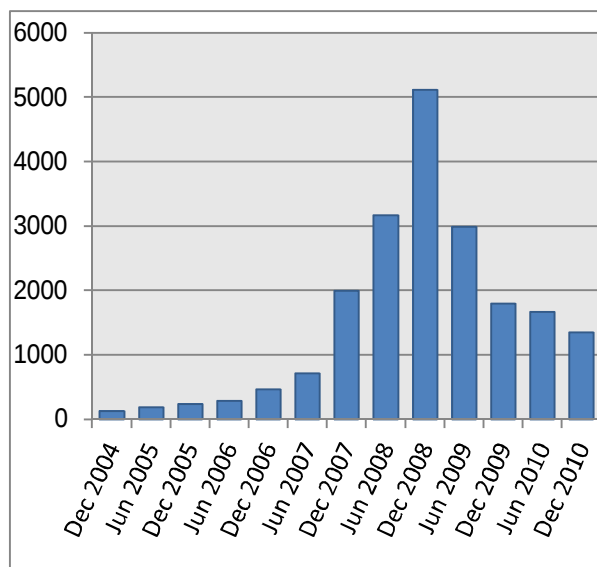
Chart 2: Measures of The Size of The CDS Market

Amounts of outstanding, in billions of US dollars^{1,2}

Notional amounts outstanding



Gross market values



¹Data from OTC Derivatives Market Activity In the First Half and Second Half of 2006, 2007, 2008, 2009, 2010, 2011 (Each covering three half year-end statistics)

²As of end-June 2004, the BIS began releasing statistics on concentration measures in the context of the semiannual OTC derivatives statistics. In response to a request from the Committee on the Global Financial System (CGFS), as of end-December 2004 the BIS began releasing semiannual statistics on credit default swaps (CDS). These include notional amounts outstanding and gross market values for single- and multi-name instruments.

Source: BIS

⁷¹ See ISDA Market Surveys Data 1987-2010 (2010, June 30).

This arguable decline did not occur because of the financial crisis in 2008. Indeed, the sharp drop in the volume of outstanding in the CDS market is due to both the move to central counterparties and portfolio compression,⁷² a practice, which *“reduces the overall gross notional size and number of outstanding contracts in credit derivative portfolios without changing the overall risk profile”*⁷³.

2.8. Development of Sovereign CDS Market during Global Financial Crisis

Since the start of the global financial crisis, CDS spreads have risen sharply in all sectors. The global financial crisis can be examined in two phases. First phase is the financial crisis of 2007-2008 beginning with liquidity issue in the banking system, can be dated from August 9, 2007 when BNP Paribas⁷⁴ announced withdrawals from three hedge funds that specialized in US mortgage debt.⁷⁵ The turbulence, that global economy has been facing, can be originated with US subprime mortgage crisis followed by a growing fear of loan defaults. Not long after, the effects of US subprime crisis have reached to global levels leading the world's major financial entities to massive troubles. While signals of how much the global financial system has become vulnerable spreading through the world, a period of volatility takes place in stock markets and banks begin to hesitate lending to each other due to threats of over exposure to potential losses on high-risk US mortgages.⁷⁶ Then, after on 15 September 2008, the global financial crisis is followed by the collapse of Lehman Brothers, which triggered a unique deterioration in public finances of the world's major advanced economies in a short period.⁷⁷ “Too Big To Fail” what has been said for such a titanic firm, Lehman Brothers, and therefore such a failure has threatened the rest of the financial system. The collapse has resulted in huge losses for many financial entities like a domino effect and severely damaged confidence in the whole system. As the insolvency of banks is becoming a fatal problem,

⁷² Vause (2010, p. 59), BIS Quarterly Review.

⁷³ See Markit definition of portfolio compression at <http://www.markit.com/en/products/data/cds-pricing/portfolio-compression.page> .

⁷⁴ BNP Paribas; a French global banking group with its four domestic markets based in Belgium, France, Italy and Luxembourg.

⁷⁵ Elliott (2011, August 7), The Guardian.

⁷⁶ See Timeline of World Financial Crisis (2011, June 23), The Telegraph.

⁷⁷ Arce et al. (2012, p. 2).

the response of governments to this issue is to channel their ability of borrowing to support banks.⁷⁸

The cost of saving private sector from collapse was very high that healing private financial institutions has made the public side weak as well as increasing government debts sharply. Surely the other vulnerable factors that effecting the whole financial system like the lack confidence of investors to the financial entities both at government and bank sides, news of continuous failures and bailouts, volatility of stock markets or financial imbalances also share a major impact on the increasing government debts. This can be referred to a direct result of the 2008 financial crisis and the beginning of the second phase of the global financial crisis, namely sovereign debt crisis, which has ongoing effects until present.

With the governments' introduction of financial rescue packages, a risk has been transferred from the banking industry to sovereigns in 2008. This condition warned market participants to reconsider their expectations for sovereign default probability.⁷⁹ Because the sovereign debts has reached to record high levels, the fact, which has been ignored for so long, is appeared that governments also can default on their debts, especially for the countries whose economies is already weak. From the late 2008 until the end of 2009, fears concerning Greece's ability to meet its debt obligations, referring to its probable case of default, has triggered a contagion effect spreading through Eurozone countries including Ireland, Portugal, Spain and Italy, introducing each a different path to the default risk scenario. A contagious crisis of confidence has dispersed through Europe reflected in increasing yield spreads on government bonds and increasing CDS spreads. Consequently, the sharply rising sovereign CDS spreads also encouraged large investors, such as banks and hedge funds, to sell CDS protection on sovereign reference entities and buy CDS protection on corporations located in the same country.⁸⁰

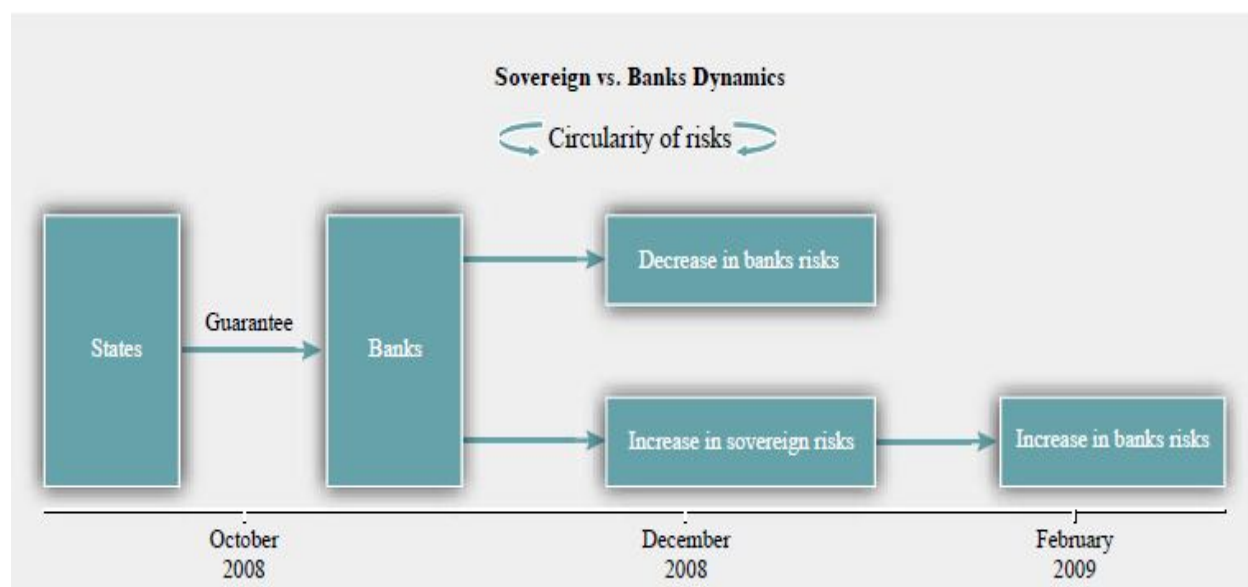
⁷⁸ See How Did We Get Here? The Economics Crisis Explained (2012, February 2). The New Economics Foundation.

⁷⁹ Duquerroy et al. (2009, p. 80), Banque de France Financial Stability Review

⁸⁰ European Central Bank (2009, p. 69).

Hence, it has been recorded that after the Lehman case, CDS premia for lower rated countries such as Greece, Spain and Italy amounted to considerably high levels regarding some highest-rated reputedly safest countries, including Germany and France, which are trading at a premium of several basis points.⁸¹ Another fact is that the usage of same currency also causes this trouble spreading quickly. However, such strong economies like Germany and France are still trying to keep their leverage at a manageable degree, their banks are holding a great percentage of Greek inevitable debt.⁸² Suchlike other European banks also holding European government debt is meaning that the risk is transferring back to the banks now (See Figure 5) and entanglement of public and private crises in this way gives a sign of forthcoming probable financial collapses.

Figure 5: Circularity of Bank and Sovereign Risk



Source: European Central Bank (2009, p.27).

⁸¹ Duquerroy et al. (2009, p. 80). Banque de France Financial Stability Review.

⁸² See "How Did We Get Here? The Economics Crisis Explained" (2012, February 2). The New Economics Foundation.

2.9. Sovereign CDS Market

As the sovereign CDS market for advanced economies has become clearer and increasingly liquid⁸³, CDS has become an important key financial instrument in sovereign debt markets that CDSs on sovereigns are trading more frequently and showing a stronger increase than corporate CDSs⁸⁴. A wide variety of market participants such as; large international banks, central banks and investors in the debt or equity of companies, benefit from the use of CDS in sovereign market as a risk management tool.⁸⁵ Post-Lehman records show increasing trade frequency for both corporate and sovereign entities, but definitely a stronger increase for the sovereign sector. The most frequent notional trade size for single-name CDS presented by IOSCO as of 2012 is USD 5 million for corporate and USD 7.1 million for sovereign entities.⁸⁶

An analysis to CDS market activity also discussed by Chen et al.(2011), which covers a CDS data set in three-month time period (May-July 2010) provides a significant observation about the trade frequency for single-name CDS that sovereign contracts are trading more frequently (2 times in the overall comparison) than corporate contracts. Bouveret (2009) mentions of how large extents CDSs on sovereigns have reached since the end of 2008, particularly for emerging countries. This is because these countries have weaker economies than developed countries and the protection demand in these economies is higher as well.

Covered in the Chart 3, presenting developments in the CDS market size, seen that in the first phase of the global financial crisis sovereign CDS transactions have expanded rapidly to an increase of %63 in the year 2007, where a higher increase at %81 level is seen for non-sovereigns. This represents a rising mistrust of investors to the financial system.

⁸³ Dieckmann and Plank (2011, p. 2).

⁸⁴ See IOSCO (2012, p. 19), Table 1:Trade frequency in the CDS market.

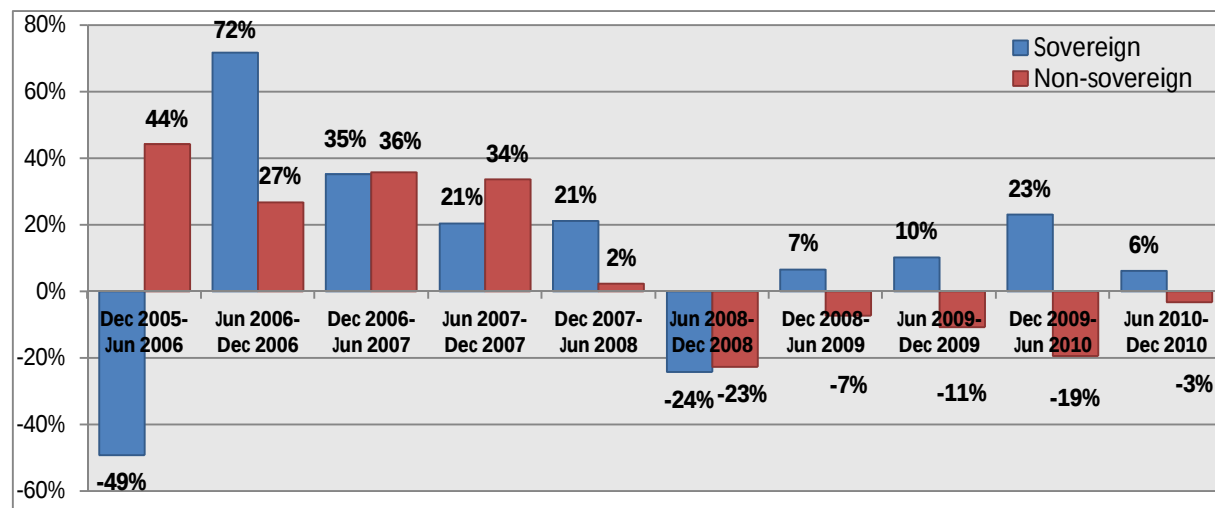
⁸⁵ See AIMA (2011, p.6).

⁸⁶ IOSCO (2012, p.19).

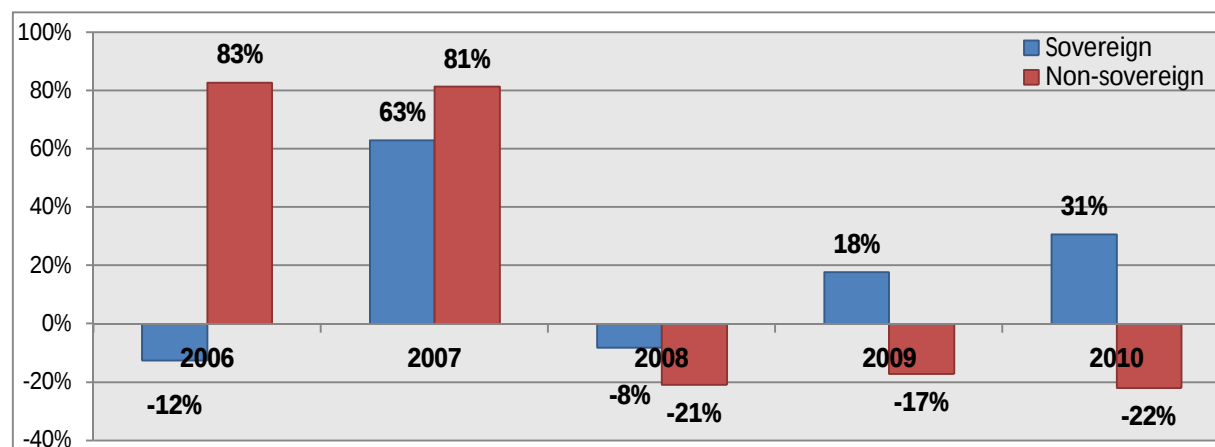
Chart 3: Developments in The CDS Market (Single-Name Instruments)

Growth rates of the notional amounts outstanding of CDS by sector ^{1, 2}

Semiannual growth rates



Annual growth rates



¹Data from OTC Derivatives Market Activity In the First Half and Second Half of 2006, 2007, 2008, 2009, 2010, 2011 (Each covering three half year-end statistics) (Presented in Table 1C)

²As of end-June 2004, the BIS began releasing statistics on concentration measures in the context of the semiannual OTC derivatives statistics. In response to a request from the Committee on the Global Financial System (CGFS), as of end-December 2004 the BIS began releasing semiannual statistics on credit default swaps (CDS). These include notional amounts outstanding and gross market values for single- and multi-name instruments.

Source : BIS

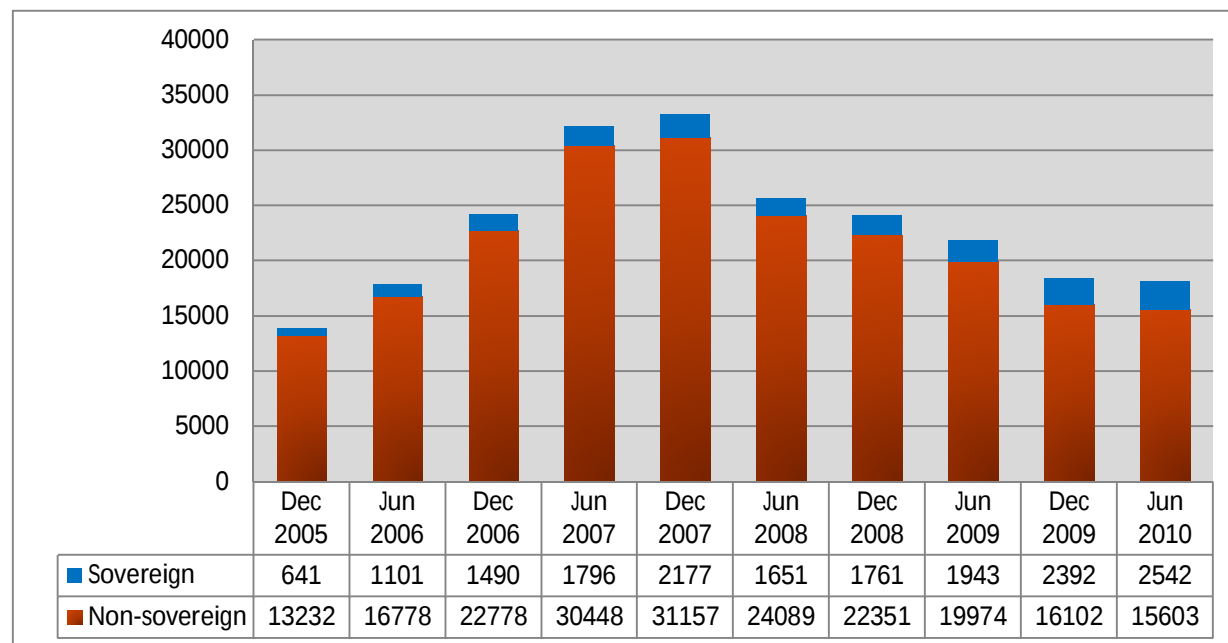
The more important fact can be observed clearly in Chart 3 that after 2008, precisely after Lehman bankruptcy, sovereign CDS amounts outstanding are growing wider each year due to sovereign debt crisis. Not only the expanding size of CDS amounts outstanding on sovereigns can be seen, but also descending amounts of non-sovereigns stand out here. As mentioned before, this is a proof for the transfer of risk to sovereigns, as well as the fact that the financial players taking advantage of the rise in sovereign CDS premia. Chart 4 also represents the increasing size of CDS on private sector during financial crisis until governments guarantee banks survivals in 2008. Then after yearly decreases in private sector as CDS size on public sector getting higher explains also the risk is switched from private entities to governments.

As the recent OTC derivatives market analysis produced by ISDA as of June 6, 2012 also mentions, there is a decay in OTC market size in recent years, as well as overall CDS market is facing a significant decline in volumes since 2008. Corresponding with Bank for International Settlements' (BIS) semi-annual statistical releases, as the most recent one covering the period ending June 2012, a decline by 8.4% can be observed in the volumes of OTC derivatives as the end of 2011 and a decline by 1.4% as the mid-2012. A declining trend also takes place in total market volume for CDS since the first half of 2008 (except the first half of 2011). Most recently CDS market volume fell 11.7% in the second half of 2011 to US\$ 28.6 trillion and then 5.9% in the first half of 2012 to USD 26.9 trillion (See Chart 5 and Table 1A), which is the lowest level since year-end 2006⁸⁷. However, sovereign volumes of the CDS market has not been affected that much by the declining impact in the overall market. Within the same time period beginning from the second half of 2006, except a sharp decline recorded at December 2008, sovereign CDS market appeared to maintain its growth, even though it happened decreasingly at some periods (See Table 1C).

⁸⁷ Outstanding volumes are not regarding clearing impact. X1

Chart 4: Size of The CDS Market by Sector (Single-Name Instruments)

Amounts outstanding, in billions of US dollars ^{1, 2}



¹Data from OTC Derivatives Market Activity In the First Half and Second Half of 2006, 2007, 2008, 2009, 2010, 2011 (Each covering three half year-end statistics) (Presented in Table 1C)

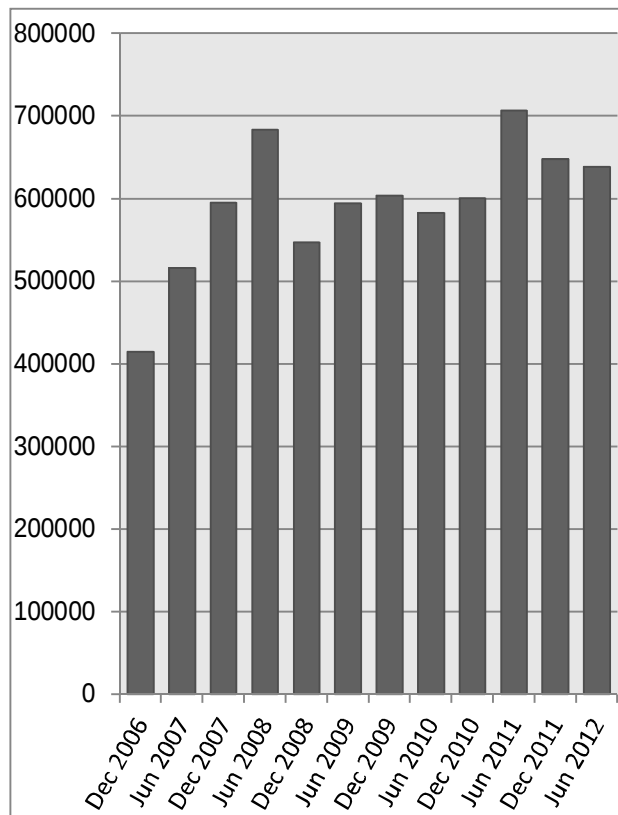
²As of end-June 2004, the BIS began releasing statistics on concentration measures in the context of the semiannual OTC derivatives statistics. In response to a request from the Committee on the Global Financial System (CGFS), as of end-December 2004 the BIS began releasing semiannual statistics on credit default swaps (CDS). These include notional amounts outstanding and gross market values for single- and multi-name instruments.

Source: BIS

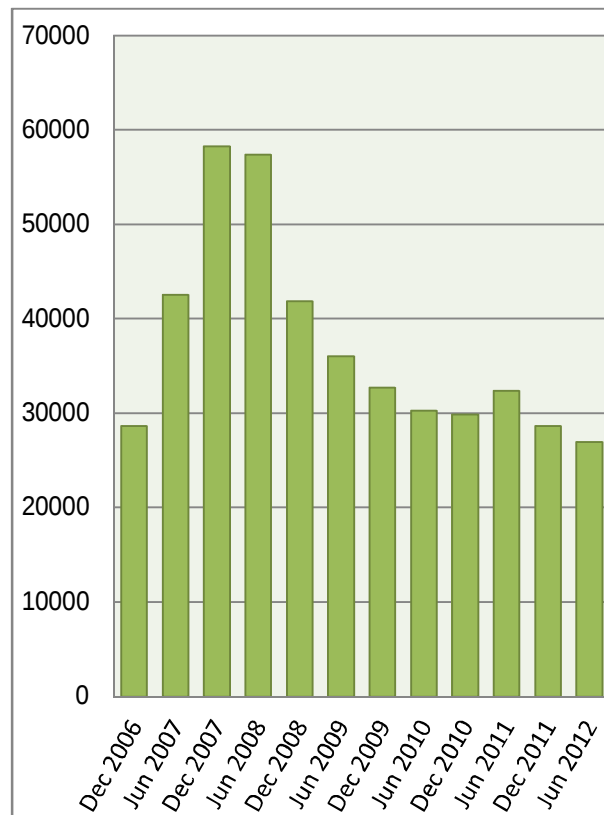
Chart 5: Size of OTC Derivatives and CDS Markets

Notional amounts of outstanding, in billions of US dollars^{1,2}

OTC derivatives market



CDS market



¹Data from OTC Derivatives Market Activity In the First Half and Second Half of 2007,2008,2009,2010,2011,2012 (Each covering three half year-end statistics) (Presented in Table 1B)

²As of end-June 2004, the BIS began releasing statistics on concentration measures in the context of the semiannual OTC derivatives statistics. In response to a request from the Committee on the Global Financial System (CGFS), as of end-December 2004 the BIS began releasing semiannual statistics on credit default swaps (CDS). These include notional amounts outstanding and gross market values for single- and multi-name instruments.

Source: BIS

3. Relevant Literature

Rating agencies' opinions always receive considerable attention in financial markets and the announcement of changes affect market spreads. These agencies have privileged access to information, and where some market participants suchlike, banks and major institutional investors, can profit by this informational advantages, many other investors only rely on agencies' ratings when they are about to assess the credit quality of borrowers and debt issues.⁸⁸ Therefore the immediate respond of agencies and the accuracy of ratings are what matters for investors.

3.1. The Impact of Firm Ratings on Bond and CDS Markets

3.1.1. Bond Market Response

One of the most important past studies of corporate bond and equity markets is prepared by Hand et al. (1992). They find that downgrades are fully anticipated by market participants and because of that no simultaneous impact on equity prices have been seen. Steiner and Heinke (2001) examine daily excess Eurobond returns associated with announcements of watch-listings and rating changes and underline an important point by questioning whether ratings from US rating agencies provide relevant information for international capital markets. They also find evidence of rating anticipation in bond market showing that most of the change in credit risk is already incorporated in prices up to 100 trading days prior to the rating change announcement.

3.1.2. CDS Market Response

More recently, with the rapid growth of credit derivatives, the influence of the credit ratings on derivative markets has become increasingly important. The most common form of credit derivative is credit default swaps (CDSs) at about 44% market share.⁸⁹ As the adjustment of ratings information (accuracy and punctual processing) steers the

⁸⁸ Micu et al. (2004, p. 56).

⁸⁹ Effenberger (2004, p. 3), Deutsche Bank Research.

credit derivatives market, Löffler (2004) addresses the problem that credit rating agencies (CRAs) reacting too slowly to carry the relevant information to the market. Since investors relate their investment decisions on opinions of rating agencies, several studies indicate that, CDS markets offer faster processing of new market information that investors enjoy this advantage in order to reach useful and early news about potential critical developments in the financial system.⁹⁰ Some authors consider how firm ratings are related to the changes in CDS spreads. In their article, Daniels and Jensen (2005) suggest that the changes in credit ratings of firms are anticipated by both the bond and CDS markets, however their results indicate that the CDS market react faster and more significantly to changes in credit ratings than the bond market. This conclusion is also supported by Di Cesare (2006) that CDS spreads seem to be relatively more efficient than other market-based indicators in anticipating negative events, where the bond market seems to provide the less reliable indicators of future rating events. Norden (2011) investigates why CDS spreads change early and substantially before credit rating announcements. His study provides direct evidence to the informational efficiency of the CDS market.

Hull et al. (2004) introduce one of the most important early works to analyze the impact of rating events on CDS prices. They focus on both the relationship between CDS spreads and bond yields for companies and the relationship between CDS spreads and announcements by rating agencies. In their data covering over 200,000 CDS spread bids and offers over a 5-year period, they examine CDS changes conditional on a ratings announcement. They consider an announcement when an actual event, or a review, or an outlook for both positive and negative judgment occurs. An overall finding of the paper presents that there is anticipation of all three types of ratings announcement by the CDS market. Their results for positive rating events are much less significant compared to negative rating events, which is consistent with the early works discussing the relationship between rating events and bond yields. This is explained here as it may be a gap of the work that there are fewer positive rating events in their sample with respect to those previous works. Micu et al. (2006) also claim that all different types of rating announcements, whether negative or positive, have a significant

⁹⁰ Deutsche Bundesbank (2004, p. 43).

impact on CDS spreads. Investors appear to value both a timely signal of possible changes in creditworthiness as well as a stable signal of underlying creditworthiness. Moreover, reviews and outlooks are considered more timely indicators of changes in credit quality than downgrades.

3.2. The Impact of Sovereign Ratings on Bond and CDS Markets

The sovereign debt crisis in Europe has made sovereign creditworthiness a major issue in recent times.⁹¹ Especially several countries in European Monetary Union face with serious decay in their economies depending on sovereign debt crises. Arce et al. (2012) try to shed light on the extent to how the sovereign CDS and bond markets do not reflect the same information on their prices. Their results show that after the subprime crisis there are persistent deviations between these markets, hence inequality has been discovered in their credit-risk valuations. As sovereign credit ratings are intended to be anticipatory measures of default risk, many respectable researchers have examined closely these markets response to the ratings.

3.2.1. Bond Market Response

A considerable number of studies have analyzed the impact of sovereign credit rating announcements on bond markets. Early studies of rating changes focus on the impact of rating announcements on sovereign bond yield spreads. Cantor and Packer (1996) confirm that the announcement of changes are followed by bond yield movements in the expected direction for both before and after rating announcements. Negative rating announcements are associated with positive changes in relative bond yields, where positive rating announcements with negative changes. Reisen and Von Maltzan (1999) run an event study exploring the market response for 30 trading days before and after rating announcements over the period 1989-1997. They find that yield spreads start to rise anticipating the downgrades and sustain after the rating event or indicate drop preceding probable rating upgrades, however give no (or weak) significant response following the rating upgrade. They also document the existence of two-way causality

⁹¹ See “How We Rate Sovereigns” (2012, March 13), Standard & Poor’s.

between sovereign credit ratings and government bond yield spreads for 29 emerging markets, that changes in sovereign ratings are mutually interdependent with changes in bond yields. Gande and Parsley (2005) focus on the spillover impact of a change in the sovereign credit rating or outlook of a country on sovereign bond spreads in other countries in a study for the period 1991-2000, for a set of 34 developed and developing countries. This cross border financial market linkages indicate a significant response to negative rating events as increase in spreads, where there is no recognizable impact arising from positive rating events abroad.

3.2.2. CDS Market Response

Given the nature of sovereign default risk, it is important to investigate the reaction of CDS spreads to rating changes for sovereigns. Works that are more recently very important rise involve the effects of the 2008-2009 financial and economic crises in their scope. Shen and Huang (2010) investigate interdependence between credit ratings and CDS spreads for sovereigns taking the sample of 31 countries with CDS data available for at least three years between January 2001 and February 2010. Their sample covers both developed and developing countries not only from Europe, but also from Asia, Africa and South America. In this context, they document their results for all sovereigns and also for sub-samples by both regions and level of development. Since for all sovereigns, long-run interdependence and short-run convergence between ratings and CDS spreads are documented, authors stand behind the idea that CDS market provides as reliable information as credit ratings for credit quality change. They observe in their results that credit ratings and CDS spreads significantly move along with each other in the same direction. As they run the econometric model for sub-samples to see if the relationships between CDS spreads and credit ratings change across sovereigns and if neighbor sovereigns have common econometric characteristics, they find that for European countries CDS data react to change of credit quality faster than ratings. Most substantial result of causality test applied to ratings and CDS spreads is presented as there is two-way causality for developing countries and considering European region there is only one-way causality from CDS spreads to ratings.

Another most valuable work focusing on the effects of sovereign credit rating announcements (and the changes in the credit rating outlook) on CDS spreads and also sovereign bond yields of European countries is added by Afonso et al. (2011a). They use daily data from January 1995 until October 2010 covering twenty four EU countries. First, they conduct an event study analysis looking at the reaction of government yield and CDS spreads before and after announcements from the rating agencies. They also look at whether spread developments anticipate rating movements. Second, they run a causality test between the ratings and yield (CDS) spreads searching possible spillover effects. One of the main results of their study is that both sovereign yields and CDS spreads response stronger to negative rating events than positives. When they test whether the effect of rating announcements has changed over time re-estimating the equation as before and after the beginning of the crisis, they report the result that the reaction of CDS spreads to negative events has increased after the 15th of September 2008 Lehman Brothers bankruptcy, while no different change is detected for the reaction of sovereign yields spreads. As they divide the whole sample into sub-samples and repeat the event study analysis for each sub-sample, the response of both sovereign yields and CDS spreads is qualitatively similar between EMU and non-EMU countries. In addition to that, any difference in the results cannot be explained as statistically significant, where reactions to announcements can be different for each credit rating agency. They find evidence of bi-direction causality between sovereign ratings and spreads and also evidence of rating announcement spillover effects, particularly from lower rated countries to higher rated countries. On the other hand, their analysis also shows that the reaction of euro area spreads to credit rating events is clear and quick.

Ismailescu and Kazemi (2010) examine the response of sovereign CDS markets to a positive or negative change in creditworthiness of an emerging economy during the years 2001-2008. Their sample covers 22 countries not only from Europe, but also countries from whole around the world. In addition to that, unlikely, their data only covers credit ratings from Standard & Poor's. These two facts about their sample simply differs their study from previous works and present some contradictions about their results compared to the precedent works performed on CDS markets. They find evidence that positive rating announcements have an immediate impact, while negative rating

announcements have no impact on sovereign CDS markets. This finding may look opposite to other works mentioned above, which all approve that markets react to credit downgrades but there is not a significant reaction to upgrades. Indeed, these authors also come to the same conclusion finding that the information content of negative credit events is strongly anticipated and already reflected in CDS spreads by the time the credit rating change is announced; alternatively, CDS spreads do not fully anticipate upcoming positive credit rating events, which seem to contain new information. Due to the reason that CDS markets absorb the effect of the rating news before it is released in the case of a negative event, CDS premiums display weakly respond to a negative announcement and afterwards. Afonso et al. (2011a) also agrees with this conclusion displaying significantly in their results that sovereign CDS spreads respond strongly in decreasing trend to positive S&P announcements (compared to other CRAs) where they respond strongly in increasing trend to negative Moody's and Fitch announcements (compared to S&P). In addition to that, for all agencies, the reaction in the CDS spreads mostly occurs during the first day of the time window, which is the day before the announcement.

As a final word to Ismailescu and Kazemi (2010), they conclude their study approving that CDS spreads provide useful information when estimating the probability of a negative rating event, but are unable to estimate the probability of an upgrade. The ability of the CDS premiums to predict a negative event is also confirmed by the results of the works mentioned above. Following this argument, the question, which will be also discussed in this paper, is raised that whether CDSs could act like an indicator of upcoming rating events and be an alternative for latecomer sovereign ratings.

4. Credit Ratings and Function of CRAs

A credit rating means “an opinion regarding the creditworthiness of an entity, a debt or financial obligation, (...) or other financial instruments”.⁹² Afonso (2011) defines a rating notation as an assessment of the issuer’s ability to pay back in the future both capital and interests. Ratings play an important role in financial markets as all the market participants such like; issuers, investors and regulators count on this information to evaluate the credit risk of financial instruments, and for this reason, the accuracy of this assessment becomes a critical issue.

Credit rating agencies (CRAs) assess credit risk borrowers (governments, financial, and non-financial firms) independently and provide information about the ability of issuers’ meeting their debt obligations.⁹³ By means of this, large public rating agencies influence financial markets and the success of the influence brings the reputation to a CRA. As the success depends on the information being timely, unbiased and accurate, the recent financial crisis has proven that the ratings can be inaccurate, untimely, and affected by CRAs conflicts of interest.⁹⁴ As mentioned by IMF in a recent report about rating crisis, European sovereign downgrades has attracted great attention in the recent financial turmoil and questions have being asked about the usefulness of CRAs and the accuracy of their credit risk assessment.⁹⁵ Like many observers, Pagona and Volpin (2010) also argue that CRAs understated the credit risk of structured debt securities and mention that since 2007 even very highly rated debt products have performed very poorly. In the past, CRAs have been criticized for being too slow to respond and not immediately downgrade the ratings.⁹⁶ As experienced on the devastating instances of finance history, CRAs were giving investment grade ratings until the last minute before Lehman went bankruptcy in 2008 and Enron collapsed in 2001.⁹⁷

⁹² See “The European Commission Regulation (EC) No. 1060/2009 on Credit Rating Agencies” (2009, September 16, p.9).

⁹³ See Haan and Amttenbrink (2011, pp. 1-3).

⁹⁴ See Bahena (2010).

⁹⁵ IMF Global Financial Stability Report (2010, October, p. 103).

⁹⁶ Haan and Amttenbrink (2011, p. 3).

⁹⁷ Haan and Amttenbrink (2011, p. 3).

In recent years, the demand for sovereign credit ratings has increased dramatically and this time CRAs have been criticized for their sovereign rating activities. Another evidence of rating failure appeared in the downgrade of Greece in the scale of four-notch by Moody's in June 2010. Such moves involving several notches at the same time catch market off guard.⁹⁸ This kind of failures has challenged the influence of CRAs as breaking the confidence of many market participants.⁹⁹ IMF also mentions in their report that CRAs are acting too slow to provide information about credit risk profile of sovereigns by delaying “*what is likely to be inevitable*”.¹⁰⁰

Especially the three major CRAs —Moody's Investor Services (Moody's), Standard and Poor's (S&P), and Fitch Ratings (Fitch)— have a significant influence on the market that market participants place a great deal of trust in the information provided by these major agencies.¹⁰¹ They are also known as “big three” CRAs and how they scale credit risks is summarized in Table 1. The three major rating agencies use similar rating scales especially S&P and Fitch have very close notations. All three agencies are rating the best quality issuers with a triple-A notation and investment grade threshold is considered at the same level by all three.¹⁰² Ratings are expressed in terms of alphabetic identifiers with respect to their rating grade.

Achieving investment grade status is a common aim shared by many emerging market economies.¹⁰³ CRAs usually signal in advance their intention to consider rating changes by providing notifications¹⁰⁴, which indicate that a rating change is likely to be happened.¹⁰⁵ When the issue is to consider a rating of a sovereign, particularly to downgrade a rating, CRAs have no hurry to take an immediate action. Downgrade of a sovereign rating is such a crucial issue, especially when the case is downgrading a

⁹⁸ IMF Global Financial Stability Report (2010, October, p. 103).

⁹⁹ Haan and Amtenbrink (2011, p. 3).

¹⁰⁰ IMF Global Financial Stability Report (2010, October, p. 112).

¹⁰¹ Daniels and Jensen (2005, p. 21).

¹⁰² Afonso et al. (2011a, p. 8).

¹⁰³ Jaramillo and Tejada (2011, p. 3).

¹⁰⁴ Notifications used by CRAs are called “rating reviews/watches” or “rating outlooks” and provide information about agencies' opinions for the future. Each notification indicates that there is a high probability of a rating change and the likely direction of such a change within a short term like the next 30 days to 90 days (reviews) or medium term like the next 12 months or two years (outlooks). A review is usually triggered by an event. (Ratings Definitions_www.fitchratings.com)

¹⁰⁵ IMF Global Financial Stability Report (2010, October, p. 89).

sovereign rating below investment grade threshold that CRAs prefer providing such credit warnings (“reviews” and “outlooks”) in advance. Hence, those credit warnings provided by CRAs might have more influence on markets than actual credit rating changes.¹⁰⁶

Table 1: S&P, Moody’s and Fitch Rating Systems

Characterization of debt and issuer	Rating		
	S&P	Moody’s	Fitch
Investment Grade			
Highest quality	AAA	Aaa	AAA
High quality	AA+	Aa1	AA+
	AA	Aa2	AA
	AA-	Aa3	AA-
Strong payment capacity	A+	A1	A+
	A	A2	A
	A-	A3	A-
Adequate payment capacity	BBB+	Baa1	BBB+
	BBB	Baa2	BBB
	BBB-	Baa3	BBB-
Speculative Grade			
Likely to fulfill obligations, ongoing uncertainty	BB+	Ba1	BB+
	BB	Ba2	BB
	BB-	Ba3	BB-
High credit risk	B+	B1	B+
	B	B2	B
	B-	B3	B-
Very high credit risk	CCC+	Caa1	CCC+
	CCC	Caa2	CCC
	CCC-	Caa3	CCC-
Near default with possibility of recovery	CC	Ca	CC
			C
Default	SD	C	DDD
	D		DD
			D

Source: Afonso, Gomes and Rother (2011)

¹⁰⁶ IMF Global Financial Stability Report (2010, October, p. 105).

5. Data Set

I collected sovereign credit ratings from Fitch's *Sovereign Ratings History*¹⁰⁷. In order to quantify credit rating events, rating developments must be transformed into discrete variables. Afonso et al. (2011b) mention a linear transformation of ratings into numerical values with two scales, where one is scale of 17 and the other is scale of 21 (which they use in their early works¹⁰⁸). Following this approach, I see fit to assign numerical values to Fitch's letter credit ratings by creating a corresponding rating scale from 1 to 21, where 1 for D and 21 for AAA. For further details, see Table 2.

Such important and enviable previous studies, which focus on the impact of sovereign credit rating announcements on CDS market, have covered different extent of datasets. For example, Afonso et al. (2011a) analyze credit ratings from all three major CRAs and consider not only the rating announcements but also rating outlooks. In another example, Ismailescu and Kazemi (2010) collect ratings history from only S&P and analyze both rating changes and changes in reviews. Another study in this context by Shen and Huang (2010) covers only sovereign credit ratings of S&P. There also differences between the studies based on countries they covered.

In this study, I define a credit event as a change in a sovereign's credit rating. Positive events are upgrades of Fitch's letter credit ratings, whereas negative events are downgrades.

Since I have assigned numerical values to Fitch's letter credit ratings, I am able to indicate a rating change $\Delta Rating_{i,t}$ of country i at day t as a numerical value by

$$\Delta Rating_{i,t} = Rating_{i,t} - Rating_{i,t-1} \quad (1)$$

¹⁰⁷ In this analysis, the data by all three agencies is not covered. In state of that, we settled for Fitch as a representative since the big-three agencies' ratings catch up each other (especially the ratings of Fitch and Standard & Poor's are showing a very high correlation).

¹⁰⁸ See Afonso et al. (2007).

Consequently, I am able to argue separately if there is an upgrade or downgrade. If an upgrade takes place, a positive value is obtained, whereas a downgrade takes place, a negative value is obtained.¹⁰⁹

Following prior studies, the data for CDS spreads, which is for the 5-year senior debt contracts, is obtained from DataStream (historical close – Euro)¹¹⁰. The daily dataset starts as the beginning of 2004 and ends as the mid of December 2010¹¹¹. It covers around 40500 observations regarding all countries in the dataset.

This analysis covers twenty three EU countries: Austria, Bulgaria, Czech Republic, Denmark; Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. Due to the unavailability of data for Belgium, Cyprus, Estonia and Luxembourg, these are omitted from the dataset¹¹².

In addition, this analysis tries to hold a view of how sovereign debt ratings are formed and which determinants have major effect on ratings. The data for the determinants is collected from *The World Bank's World Development Indicators (WDI) database*. In the analysis the following six macroeconomic variables are included¹¹³:

- GDP growth (annual percentage). Annual percentage growth rate of GDP at market prices based on constant local currency.
- GDP per capita (PPP). GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates.

¹⁰⁹ For example, if a country is downgraded from AAA grade to AA grade, this means that it is downgraded from 21 to 19 in the numerical sense according to our numerical scale. Consequently, this downgrade reflects a negative change of (-2) numerically [Change in the rating = 19 – 21 = -2]. In the case of an upgrade, let us say a country is upgraded from AA+ grade to AAA grade. This turns out to be an upgrade from 20 to 21, and a positive change of (1) numerically [Change in the rating = 21 – 20 = 1].

¹¹⁰ See Afonso, Furceri and Gomes (2011) and Shen and Huang (2010).

¹¹¹ For some countries CDS data starts on a later date.

¹¹² Since credit ratings for these countries have not changed during the period of our analysis (except Estonia), I assume that omitting these countries has no crucial effect on our results.

¹¹³ Descriptions are available at The World Bank, World Development Indicators (WDI) database.

- Cash surplus/deficit (percentage of GDP). Cash surplus or deficit is revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.
- Central government debt, total (percentage of GDP). Debt is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans. It is the gross amount of government liabilities reduced by the amount of equity and financial derivatives held by the government.
- Adjusted net savings (excluding particulate emission damage, percentage of GNI). Adjusted net savings are equal to net national savings plus education expenditure and minus energy depletion, mineral depletion, net forest depletion, and carbon dioxide. This series excludes particulate emissions damage.
- Inflation, consumer prices (annual percentage). Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.

In the following sections, I will analyze the influence of the macroeconomic determinants on the ratings and try to develop an understanding of their explanatory power on the ratings during the recent European debt crisis concerning especially the highly risk bearer PIIGS countries and countries taking part in Eurozone^{114,115}. The paper also seeks to describe the relation between sovereign credit ratings and sovereign CDS spreads, again with a special concern for the PIIGS and Eurozone countries.

¹¹⁴ See also Gartner et al. (2011).

¹¹⁵ 13 Eurozone countries included in our data: Austria, Finland, France, Germany, Greece, Ireland, Italy, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain

Table 2: Assigning Numerical Values to Fitch's Letter Credit Ratings			
		Credit rating	Numerical Value
Investment Grade	Highest quality	AAA	21
	High quality	AA+	20
		AA	19
		AA-	18
	Strong payment capacity	A+	17
		A	16
		A-	15
	Adequate payment capacity	BBB+	14
		BBB	13
		BBB-	12
Speculative Grade	Likely to fulfill obligations, ongoing uncertainty	BB+	11
		BB	10
		BB-	9
	High credit risk	B+	8
		B	7
		B-	6
	Very high credit risk	CCC+	5
		CCC	4
		CCC-	3
	Near default with possibility of recovery	CC C	2
	Default	DDD DD D	1
Source: Source: Afonso,Gomes and Rother (2011)			

6. Empirical Methodology & Analysis

Following previous works, this paper applies a standard event study methodology to examine how CDS markets respond to Fitch's credit rating announcements during the years 2004 – 2010 and try to make a meaningful explanation to the relation between two risk evaluators. As CDS markets have been influenced by agencies' opinions about credit riskiness of sovereigns, agencies are developing their opinions considering also the tendency in CDS markets as well. CDS spreads not only respond to the rating events, but also reflect the market's perception of risk. CDS market absorbs the information related to the changes in the ratings before any announcement takes place and whenever a large movement in CDS prices occurs, it appears to be that the rating actions are the result of markets' views.¹¹⁶

My analysis begins with the step to understand sovereign debt ratings by identifying the set of indicators that may determine sovereign debt ratings. Since I know that PIIGS countries are the most affected by the European sovereign debt crisis, with regard to this, I search for a significant result explaining this correlation of the ratings for PIIGS countries and the influence of the crisis.

Building on the methodology provided by the existing literature¹¹⁷, I applied *Ordered Logistic Regression*¹¹⁸ to my data in order to explain sovereign debt ratings. I also employ the same model generated by Gartner et al. (2011) to answer the question if the ratings for PIIGS countries explain the effects of crisis. Compared to this previous work, I added some distinction to my analysis. I considered the crisis period as the beginning of 2007 until the end of 2010. In the model the rating $Rating_{i,t}$ of country i at day t is described by

$$Rating_{i,t} = \alpha + \beta X_{i,t} + \gamma C_{i,t} + \delta P_{i,t} + \lambda (P_{i,t} \times C_{i,t}) + \varepsilon_{i,t} \quad (2)$$

¹¹⁶ Afonso et al. (2011a, p. 15).

¹¹⁷ See Afonso, Gomes and Rother (2007, 2009) and Gartner et al. (2011)

¹¹⁸ Regressions are employed with the help of statistical analysis software, STATA.

where α denotes the intercept, $\beta, \gamma, \delta, \lambda$ are vectors of coefficients, $X_{i,t}$ a vector of macroeconomic variables, $C_{i,t}$ is a dummy variable for the years of crisis from 2007 to 2010, $P_{i,t}$ is a dummy variable for the PIIGS countries Portugal, Ireland, Italy, Greece and Spain, $P_{i,t} \times C_{i,t}$ is an interaction term of the crisis and the PIIGS dummy and $\varepsilon_{i,t}$ reflects an error term.

The results for the model are displayed in Table 3 and for all variables are significant at the 1% level. Variables GDP growth, GDP per capita and cash surplus/deficit are positively correlated with sovereign ratings as I expected, where GDP per capita has an obvious lower effect on ratings. Other macroeconomic variables central government debt, adjusted net savings and Inflation also expectedly reflect a correlation in a negative manner. According to the results in the second column of the table, ratings for the members of Eurozone 1.37 notches higher than non-member countries in our sample. As observed in the third column, PIIGS countries' average ratings stay lower (-1.967 notches) than the average rating of the other countries in the sample. Likewise, in the fourth column of the table consistent result for PIIGS countries' average ratings during the crisis has been provided that they stay lower (-.812 notches). Another consistent result is clearly seen in the last column that as I expected, during the crisis all countries in the sample have lower ratings than the rest of the period I examined (-2.43 notches). All variables both macroeconomic and dummy variables explain 0.52 of the variance in the ratings of our sample according to the pseudo R^2 which I assumed it good as a fit.

In Table 4, the results stand for if the changes in the ratings explain the changes in CDS spreads in a time window as one day before ($t-1$) and one day after ($t+1$) the occurrence of a rating event (at time t). Changes in the ratings are evaluated as described before (See (1)). I assigned the difference of the CDS spreads between the day after ($t+1$) and the day before ($t-1$) the rating event ($t=0$) to the day t for the sake of data matching (See (3)).¹¹⁹

¹¹⁹ As an example, Bulgaria is upgraded on 17th of August in 2005 numerically from 13 to 14 according to our scale. Rating difference on 17.08.2005 is 14-13=1 and CDS spread difference assigned to 17.08.2005 is calculated as the difference of the data corresponding to the dates of 18.08.2005 and 16.08.2005, respectively 37,2 – 36 = 1,2 bps.

Table 3: Explaining Sovereign Debt Ratings

	Dependent Variable: Ratings			
	(I)	(II)	(III)	(IV)
GDP growth	0.140*** (43.82)	0.137*** (41.58)	0.123*** (35.65)	0.0582*** (16.72)
GDP per capita (PPP)	0.000525*** (113.35)	0.000501*** (109.28)	0.000515*** (110.08)	0.000681*** (104.91)
Cash surplus/deficit	0.263*** (34.13)	0.203*** (23.40)	0.261*** (34.80)	0.287*** (33.12)
Central government debt	-0.0403*** (-53.87)	-0.0484*** (-58.86)	-0.0342*** (-36.93)	-0.0523*** (-52.38)
Adjusted net savings	-0.151*** (-33.46)	-0.105*** (-23.55)	-0.171*** (-31.35)	-0.269*** (-40.20)
Inflation (consumer prices)	-0.185*** (-30.38)	-0.163*** (-25.57)	-0.180*** (-30.78)	-0.126*** (-18.62)
Eurozone	---	1.370*** (32.44)	1.587*** (37.80)	1.044*** (22.19)
PIIGS	---	---	-1.967*** (-30.36)	-1.229*** (-15.24)
PIIGS x Crisis	---	---	---	-0.812*** (-9.75)
Crisis	---	---	---	-2.433*** (-48.62)
Intercept	0.481*** (4.39)	0.612*** (5.72)	0.601*** (5.44)	0.0743 (0.62)
<i>N</i>	24130	24130	24130	24130
pseudo <i>R</i> ²	0.450	0.462	0.473	0.523

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Data for indicators of 23 EU countries between 2004 and 2010 from The World Bank, World Development Indicators (WDI) database. Included 13 Eurozone countries. PIIGS: Portugal, Ireland, Italy, Greece, Spain.

Adjusted ratings from Fitch's Sovereign Ratings History (transformed into discrete numbers).

Period for the data: 2004-2010. Crisis period: between 2007-2010.

$$\Delta Rating_{i,t} = Rating_{i,t} - Rating_{i,t-1} \quad (1)$$

$$\Delta CDS_{i,t} = CDS_{i,t+1} - CDS_{i,t-1} \quad (3)$$

According to the results of this regression presented in Table 4, even I could obtain an expected negative correlation between the changes of ratings and CDS spreads as I expected, unfortunately, this result appeared as insignificant. Considering all sample, I was able to generate the total effect in the occurrence of an event as presented in Table 5. The results suggest that in the case of a positive event through whole sample, the sum of the changes in CDS spreads happens to be a decrease at 32.4 bps, whereas the case of a negative event causes an increase at 876.01 bps. While the signs related to the changes are exactly what I expected, in the light of this result I can say that bad news have stronger effects on CDS spreads.

Table 4: Regression CDS Spread Changes and Rating Changes in a Two-Day Window

Time window	[-1,1]
	CDS spread changes
Rating changes	-27.85 (-1.53)
_cons	15.12 (0.69)
<i>N</i>	30
<i>R</i> ²	0.077

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

CDS spread data for 23 EU countries between 2004 and 2010 from DataStream.

Adjusted ratings from Fitch's Sovereign Ratings History (transformed into discrete numbers).

Result for the regression is obtained by using OLS Regression in STATA.

Table 5: Effects of Rating Events on CDS Spreads

Positive Events				
Country	Date of Event	Δ Rating	Δ CDS*	Cumulative Change**
BULGARIA	04-08-04	1	1	1
BULGARIA	17-08-05	1	1.2	2.2
CZECH REP.	26-08-05	1	-0.1	2.1
CZECH REP.	04-03-08	1	-20.2	-18.1
LITHUANIA	28-01-04	1		-18.1
LITHUANIA	23-10-06	1	0	-18.1
ROMANIA	17-11-04	2	-8.7	-26.8
ROMANIA	31-08-06	1	-7	-33.8
SLOVAKIA	22-01-04	1	1.4	-32.4
SLOVAKIA	21-09-04	1	0	-32.4

Negative Events				
Country	Date of Event	Δ Rating	Δ CDS*	Cumulative Change**
BULGARIA	09-11-08	-1	360	360
GREECE	16-12-04	-1	0.3	360.3
GREECE	22-10-09	-1	6.715	367.015
GREECE	08-12-09	-1	-29.275	337.74
HUNGARY	12-01-05	-1	-6	331.74
HUNGARY	20-09-06	-1	3.5	335.24
HUNGARY	09-11-08	-1	259.5	594.74
IRELAND	08-04-09	-1	-42.24	552.5
IRELAND	06-10-10	-3	64.965	617.465
ITALY	19-10-06	-1	1.6	619.065
LATVIA	17-08-07	-1	0	619.065
LATVIA	03-10-08	-1	41.6	660.665
LATVIA	12-11-08	-1	58.3	718.965
LATVIA	08-04-09	-1	-146.845	572.12
LITHUANIA	03-10-08	-1	46.7	618.82
LITHUANIA	22-12-08	-1	-14.4	604.42
LITHUANIA	08-04-09	-1	-124.19	480.23
MALTA	12-07-07	-1	0	480.23
POLAND	23-03-05	-1	1	481.23
PORTUGAL	24-03-10	-1	4.78	486.01
ROMANIA	09-11-08	-2	390	876.01

Results are generated on STATA.

*Changes in CDS spreads, **Cumulative change in CDS spreads in terms of bps.

For the sake of obtaining more significant results, I followed the model employed by Afonso et al. (2011a). I assessed how sovereign credit ratings affect the trend of sovereign CDS spreads. As in this previous work, a dummy variable¹²⁰ is used for the change in ratings; I evaluated it numerically by giving the exact difference for each rating change in order to involve the magnitude of effect in rating changes in my model:

$$CDS_{i,t} = \alpha + \rho CDS_{i,t-1} + \beta \Delta Rating_{i,t} + \delta P_{i,t} + \varepsilon_{i,t} \quad (4)$$

where dependent variable $CDS_{i,t}$ is CDS spread of country i at day t , α denotes the intercept, ρ , β and δ are vectors of coefficients, $CDS_{i,t-1}$ is an independent variable for country i at day $t-1$, $\Delta Rating_{i,t}$ (See (1)) and $P_{i,t}$ (See (2)) are as defined before describing the rating difference and dummy variable for the PIIGS countries respectively, and $\varepsilon_{i,t}$ reflects an error term.

Table 6: Effect of Sovereign Credit Ratings on CDS Spreads (Concerning PIIGS Countries)

	Dependent Variable: CDS spreads	
	(I)	(II)
CDS spreads (t-1)	0.961*** (587.99)	0.961*** (587.27)
Rating changes	-10.31* (-1.77)	-10.01* (-1.72)
PIIGS	---	2.039*** (3.42)
Intercept	3.299*** (13.30)	3.005*** (11.45)
N	32281	32281
R^2	0.915	0.915

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

CDS spread data for 23 EU countries between 2004 and 2010 from DataStream.

Adjusted ratings from Fitch's Sovereign Ratings History (transformed into discrete numbers).

PIIGS: Portugal, Ireland, Italy, Greece, Spain.

Results for all regressions are obtained by using OLS Regression in STATA.

¹²⁰ A dummy variable that takes value equal to 1 when the credit rating changes (either negatively or positively) or takes zero. In addition to that, the results are presented separately with respect to the sign of the change (as negative events or positive events). [Afonso et al. (2011a)]

The nature of the movement in CDS spreads is examined by OLS regression and the results for the model is presented in Table 6. In the first column, I analyzed the trend in CDS spreads by looking at the influence of one day before values of CDS spreads. I saw the trend of CDS spreads with respect to one day before values is the same and they are positively correlated (0.961) at %1 significance level, meaning if CDS spreads for a country are in an increasing trend, then they continue to increase and the other way around decrease in the same way if the trend is decreasing. This result also proves that nothing can happen dramatically in one day and might support the claim that CDS market absorbs the information ahead of time. In the same column, the correlation between the sovereign rating changes and CDS spreads is presented. According to this significant result, changes in ratings cause CDS spreads in a negative trend to act as I predicted. An increase in the ratings causes a decrease in CDS spreads and vice versa. In the light of these presented results, I employed the model concerning whether the PIIGS countries suffer more due to the changes in ratings. In the second column, the positively correlated result for PIIGS dummy tells us that a PIIGS country is riskier than others are, because CDS spread for PIIGS countries is on average 2.039 basis point higher than the other countries' spreads at %1 significance level.

Table 7: Spread Changes of PIIGS and Eurozone Countries

	Dependent Variable: CDS spreads
Eurozone	-82.60^{***} (-55.57)
PIIGS	40.33^{***} (23.15)
_cons	108.9 ^{***} (111.34)
N	36091
R ²	

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

CDS spread data for 23 EU countries between 2004 and 2010 from DataStream.

Adjusted ratings from Fitch's Sovereign Ratings History (transformed into discrete numbers).

Included 13 Eurozone countries. PIIGS: Portugal, Ireland, Italy, Greece, Spain.

Results for all regressions are obtained by using OLS Regression in STATA.

I have built another model to measure the response of CDS spreads for PIIGS countries and Eurozone countries without any influential concern of independent variables.

I re-wrote the model (4) according to this view:

$$CDS_{i,t} = \alpha + \delta P_{i,t} + \gamma E_{i,t} + \varepsilon_{i,t} \quad (5)$$

where I included $E_{i,t}$ which is a dummy variable for Eurozone countries, and the other variables stand same as described before (See (4)). According to the results for the model presented in Table 7, Eurozone countries have lower CDS spreads with 82.60 basis points on average than the rest countries in the sample and in addition to that, PIIGS countries have higher CDS spreads with 40.33 basis points on average than the rest countries in the sample. As these results are significant at %1 level, I must emphasize a very important point that each PIIGS country is also a member of Eurozone. With this aspect of my results, I can underline that CDS spreads for PIIGS countries do not dominate the Eurozone average as the signs for each dummy variable is different from each other and the values are sufficient and significant enough. Otherwise, coefficient for the Eurozone dummy must have been positive value. This result is also another proof that PIIGS countries are affected and suffered more among other European countries due to the evolutionary financial crisis.

7. Conclusion

Sovereign creditworthiness has attracted great attention during the recent European sovereign debt crisis. As credit ratings seem to be not reflecting the real risk perception of the market throughout the sovereign debt turmoil, CDS spreads gained more importance by being more accurate and immediate risk indicator for sovereign market. Therefore, in the light of prior studies over relevant subjects, I carried out a standard event study analysis for a set of EU countries, which has available data of CDS spreads and credit ratings (Fitch ratings) starting as the beginning of 2004 and ending as the end of mid-December 2010. This study investigates the impact of changes in credit ratings and tries to explain their interaction with the changes in CDS spreads and with several macroeconomic determinants. In addition, a special concern for highly risky PIIGS

countries and Eurozone countries is hold by the study, and in order to catch more clear evidence over the relation, the period of crisis is particularly put under the scope.

Main results of the study can be summarized as follows: i) All the macroeconomic variables can explain the ratings in a significant way, only GDP per capita among other indicators has an obvious lower effect on ratings ii) Concerning the influence of PIIGS countries and crisis period either separately or together, significant results with lower average credit ratings are obtained for all concerns. iii) There is no significant correlation between the changes in credit ratings and the changes in CDS spreads in a time window of one day before and one day after a rating event. iv) Nevertheless, assumed results are obtained as the events in the two-day window are grouped and analyzed separately according to their signs. The result proves that negative events have stronger effects on CDS spreads. v) CDS market absorbs the information ahead of time; therefore, CDS spreads with respect to one-day before values acts in the same trend. vi) However, CDS spreads for PIIGS countries appear to be significantly riskier than the other countries' CDS spreads with respect to one-day before values. vii) Eurozone countries have lower CDS spreads on average than the rest countries in the sample. viii) PIIGS countries have higher CDS spreads on average than the rest countries in the sample. As PIIGS countries are also included in Eurozone, the results show that CDS spreads for PIIGS countries do not dominate the Eurozone average.

This study shed some additional light on the impacts of European debt crisis. The results of the study are mostly significant; they show that in every aspect of the analysis, PIIGS countries are affected and suffered more from the outcome of financial crisis among other European countries. The period of European debt crisis explains significantly the negative correlation of CDS spreads and credit ratings, particularly the stronger impact of negative events on CDS spread changes.

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Appendix 1

Table 1A: Credit Default Swaps Market		
	Notional amounts outstanding	Gross market values
Dec 2004	6396	133
Jun 2005	10211	188
Dec 2005	13908	243
Jun 2006	20352	294
Dec 2006	28650	470
Jun 2007	42581	721
Dec 2007	58244	2020
Jun 2008	57403	3192
Dec 2008	41883	5116
Jun 2009	36098	2987
Dec 2009	32693	1801
Jun 2010	30261	1666
Dec 2010	29898	1351
Jun 2011	32409	1345
Dec 2011	28626	1586
Jun 2012	26931	1187
*Amounts outstanding, in billions of US dollars		

Table 1B: OTC Derivatives Market (Grand Totals)		
	Notional amounts outstanding	Gross market value
Dec 2004	257894	9377
Jun 2005	281493	10605
Dec 2005	297670	9749
Jun 2006	369906	10074
Dec 2006	414845	9691
Jun 2007	516407	11140
Dec 2007	595738	15834
Jun 2008	683814	20375
Dec 2008	547371	32244
Jun 2009	594553	25298
Dec 2009	603900	21542
Jun 2010	582685	24697
Dec 2010	601046	21296
Jun 2011	706884	19518
Dec 2011	647777	27278
Jun 2012	638928	25392
*Amounts outstanding, in billions of US dollars		

Table 1C: CDS Notional Amounts Outstanding (Single-Name Instruments)		
	Sovereign CDS contracts	Non-sovereign CDS contracts
Dec 2005	1258	9174
Jun 2006	641	13232
Dec 2006	1101	16778
Jun 2007	1490	22749
Dec 2007	1798	30688
Jun 2008	2177	31235
Dec 2008	1651	24089
Jun 2009	1761	22404
Dec 2009	1943	19974
Jun 2010	2392	16102
Dec 2010	2542	15603
Jun 2011	2749	15356
Dec 2011	2928	13937
Jun 2012	2848	12718
*Amounts outstanding, in billions of US dollars		

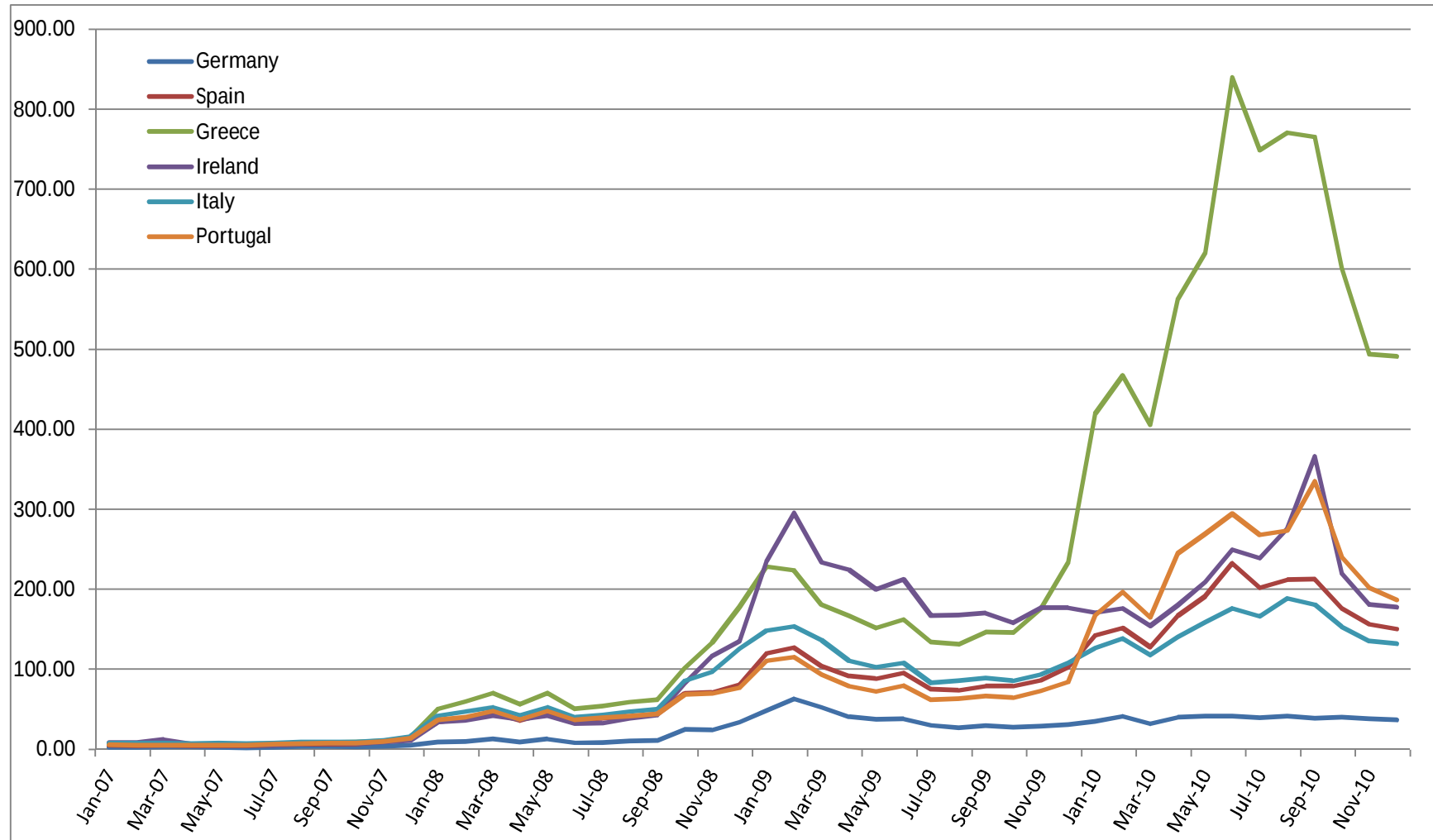
*Data from OTC Derivatives Market Activity In the First Half and Second Half of 2006, 2007, 2008, 2009, 2010, 2011 (Each covering three half year-end statistics)

²As of end-June 2004, the BIS began releasing statistics on concentration measures in the context of the semiannual OTC derivatives statistics. In response to a request from the Committee on the Global Financial System (CGFS), as of end-December 2004 the BIS began releasing semiannual statistics on credit default swaps (CDS). These include notional amounts outstanding and gross market values for single- and multi-name instruments.

Source: BIS

Appendix 2

Chart 6: CDS Spreads of PIIGS Countries during Crisis (Compared to German CDS Spreads)*



*This chart is constructed from the data sample this study covers.

Abstract (German)

Diese Arbeit stellt eine Event-Studie Analyse der Beziehung zwischen Credit Default Swap (CDS) Spreads und Ratings für Staatsanleihen im Rahmen der europäischen Schuldenkrise dar. Die empirische Analyse untersucht diese Beziehung auch mit Rücksicht auf PIIGS-Staaten und auf die Länder der Eurozone. Die wichtigsten Ergebnisse zeigen: PIIGS-Staaten sind betroffen und litten mehr an dem Ergebnis der Finanzkrise unter den anderen europäischen Ländern. Die Periode der europäischen Schuldenkrise erklärt deutlich die negative Korrelation zwischen CDS-Spreads und Ratings, insbesondere die stärkere Auswirkungen negativer Ereignisse auf CDS-Spread-Veränderungen.

Curriculum Vitae

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Education & Training

2009 - Present : University of Vienna (Vienna)

- Master of Business Administration (German-English)
- Major in Corporate Finance and Supply Chain Management
- Thesis in the field of Corporate Finance

2009 : University Preparation Program

- March – September, German Course, B2 Level

2004 – 2008 : Marmara University (Istanbul)

- Bachelor of Business Administration(English)
- Major in Finance, GPA 3.11/4.00

1997 – 2004 : Bornova Anatolian High School (İzmir)

- Graduation degree of 5.00/5.00 (English)

Professional Experience

CITIBANK A.Ş. (İSTANBUL) 20.10.2006 – 30.05.2008

Position: Part-time First Level Credit Loan Reviewer, AFU (Accounting Fulfillment Unit)

- *Awarded as Best Part-time First Level Credit Loan Reviewer in 2007 4th quarter.*
- Analyze and evaluation of applications through required banking data systems.

GÜRELİ YMM A.Ş. (İSTANBUL) 17.07.2006 - 18.08.2006

(Audit, Accounting and Attestation)

Position: Tax Audit Assistant (Internship) to Certified Public Accountants,

- Preparing required financial statements and other documents for senior auditor and manager, experience in field.

Computer Skills

- Windows and Microsoft Office Tools (advanced)
- Xpress IVE (basic)
- Stata (basic)

Languages

- Turkish : native
- English : fluent
- German : intermediate

Interests

Music, professional drum playing, social events.