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„Did Credit default swaps contribute to the systemic risk in the Great Financial Crisis?"

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Anna Macháčková, Bakk.

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Abstract

Credit Default Swaps (CDSs) are derivative instruments that enable financial institutions to manage their credit risk. Prior the outbreak of the financial crisis of 2008, they were traded over-the-counter, outside any regulatory oversight and without accurate recordkeeping. The majority of academics believed that CDSs enhance the stability of the financial system and thus, have a positive effect on financial markets.

But with the failure of some big players such as Lehman Brothers, Bear Stearns or AIG, many have also changed their mind. Derivatives, and in particular CDSs, are increasingly viewed as the cause of the crisis. Therefore, this paper aims to answer the question whether CDSs did contribute to the systemic risk in the Great Financial Crisis.

To receive an answer to this question, we firstly perform a critical review of the existing literature on this subject. Then we analyze the involvement of CDSs in the failure of AIG as well as Lehman Brothers.

The thesis finally concludes that CDSs were not the primary cause of the crisis but they significantly weakened the stability of the financial system and exacerbated the financial crisis.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AIG	American International Group, Inc.
AIGFP	AIG Financial Products Corporation
BIS	Bank for International Settlements
DTCC	Depository Trust & Clearing Corporation
CDS	Credit Default Swap
CCP	Central Counterparty
FCIC	Financial Crisis Inquiry Commission
ISDA	International Swaps and Derivatives Association
MBS	Mortgage-backed security
OTC	Over-the-Counter
Repo	Sale and Repurchase agreement
SPV	Special Purpose Vehicle

1. Introduction

Although CDSs are relatively young financial instruments - they were created in 1994 by JP Morgan as a means of transferring the credit risk - they have received a high attention aftermath of the recent financial crisis[1]. There is a lot of studies that suggest that "*the extensive use of these instruments was a significant contributing factor to the GFC that so severely destabilized world financial systems*"[2]. But on the other hand, there are some proponents of the CDSs that argue that "*CDSs was not a cause of the crisis; it was just the effect of losses on mortgage securities*"[3]. Although the crisis seems to have been overcome, there is still no explicit answer to the question if did the CDSs contribute to the systemic risk in the recent financial crisis? Therefore, as the main subject of this master thesis, we have defined to answer this question.

All the controversy surrounding this product and the unflagging debate about its involvement in the failure of big institutions such as Bear Stearns, Lehman Brothers, and AIG makes it an attractive research area. But the opaque nature of the CDS market and related lack of the publicly available data makes it hard to access relevant information even for regulators. Therefore, also the academic research in this area has been long focusing more or less on logical reasoning than on empirical studies. In the recent years also new approach was established – the network analysis of CDS market. In this thesis, we will present and summarize various views of academics on the problem of CDSs and their involvement in the recent financial crisis.

To answer the given research question, we have determined the partial goals. The first goal is to familiarize ourselves with the main issues of CDSs, with their modifications and specifics. We will study the key concepts and the way the CDS market operates. Then we will introduce the motives for using these instruments and their impact on the participating parties. Furthermore, in the next section, we will analyze the role played by CDSs in the creating and later bursting of the housing bubble. Subsequently, we will turn to the risks inherent in CDS instruments that

[1] In this paper, we use the term "financial crisis" for the Financial crisis of 2008.
[2] Dias (2015), p. 2.
[3] Mattar, Sougne (2011), p. 354.

could pose a threat to the stability of the entire financial system. As will be shown later, the most serious threat is the counterparty risk that could arise under specific conditions to the level of systemic risk. Moreover, we will also discuss the transparency issues and moral hazard posed by CDSs.

Then we move to the practical part of the thesis, where we will analyze the impact of the use of CDSs on the stability of the financial system. For this purpose, we will discuss the two most prominent moments of the recent financial crisis, the bankruptcy of Lehman Brothers and the near-failure of AIG, and all the issues that these preceded. In both institutions, CDSs accounted for a significant part of their business portfolio, but AIG was a pure seller of these contracts while Lehman had more balanced books. We will try once again to answer the question if the CDSs caused the failure of these firms and so contributed to the systemic risk in the financial crisis.

In the last chapter of the paper, we will deal with the possible solutions that could improve the transparency and reduce the counterparty risk in the CDS market. And finally, we will summarize our findings and provide concluding remarks.

2. Theoretical background of CDSs

Before we start to deal in detail with one type of credit risk transfer instrument – CDSs - it is necessary to explain what we understand under the term credit risk. Credit risk could be defined as "*the potential that a bank borrower or counterparty will fail to meet its obligations in accordance with agreed terms*"[4]. Generally, for financial institutions, the largest and most common source of credit risk are loans. Besides, they are also exposed to other sources of credit risk, such for example foreign exchange transactions, financial futures, swaps, options and many others. Therefore, financial institutions use multiple methods and instruments to measure, manage and mitigate credit risk. To the traditional ways such as creation and maintaining of adequate reserves and provisions or pledging of collaterals and guarantees were in 1993 added new instruments – credit derivatives.

[4] Basel Committee on Banking Supervision (2000), p. 1.

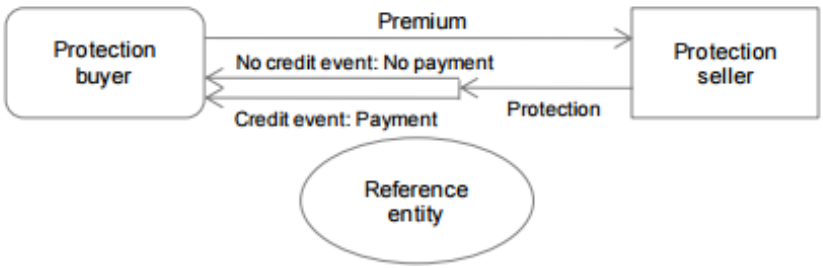
Credit derivatives serve as financial tools to transfer the credit risk of the borrower from the lender to the third party. There are many different types of credit derivatives, e.g. credit default swaps, collateralized debt obligations, total return swaps, credit linked notes, asset swaps or credit spread forwards/options.[5]

Our aim in this paper is not to study all the different types of credit derivatives. We will rather focus only on the very simple, but extremely popular form of a credit derivative - on CDS.

2.1 Definition of CDS

CDS is a bilateral contract designed to transfer the credit risk of an underlying reference entity. The buyer of the protection makes regular payments (referred as a CDS premium or spread) until a credit event occurs when in exchange, the protection seller must pay the buyer of protection a compensation payment. The compensation payment is based on the cash or physical settlement which was agreed up-front. If no credit event occurs until the maturity of the CDS contract, the contract simply expires, and the protection buyer receives no payment.[6] Figure 1 summarizes the basic structure of CDS agreement.

Figure 1: CDS contract



Source: Weistroffer (2009), p. 4.

The CDS spread is determined as a percentage of the notional amount (i.e. face value) of the underlying bond. For example, if a CDS on a $1 million bond has a spread of 100 basis points (1 basis point = 0.01%), then the protection buyer pays the protection seller the annual premium of $10,000. In general, premium payments

[5] FINCAD [Retrieved April 16, 2017].
[6] Weistroffer (2009), p. 4.

are made at quarterly intervals. The implementation of CDS Bing Bang and CDS Small Bang protocols in 2009 brought the standardization of premium payments at 100 or 500 basis points for the US CDS market and 25, 100, 500 or 1000 for European CDSs. The difference between the standard premium payment and the market price of the contract is compensated with an upfront payment. [7]

It is evident that the CDS contract has many similarities with insurance contracts, but the main difference is that the buyer of the insurance in CDS contract does not need to hold the underlying reference bond and so does not need to incur a loss to obtain the compensation payment. Therefore, CDS could be used as an instrument for speculation.

CDS are non-exchange-traded instruments; the trading takes place over-the-counter. The supervision body over the CDS contracts is ISDA. The ISDA Master Agreement, which was issued in 1992 and updated in 2002, provides a basic framework for all CDS transactions. It includes a standard legal background for bargaining of all CDS agreements. Besides, these are also governed by ISDA Credit Derivatives Definitions (most recent version is from 2014) which includes the core terms used in CDS transactions such as the definition of credit events, settlement terms or reference entity.[8]

In general, ISDA distinguishes between six credit events, namely:[9]

- Bankruptcy – The reference entity is unable to repay its outstanding debts.
- Obligation acceleration – The obligation becomes due and payable before its maturity day.
- Failure to pay – Failure of reference entity to make any payments at the due date.
- Repudiation/Moratorium – The reference entity or governmental authority disclaims, repudiates or otherwise assaults the validity of its commitments.
- Restructuring – Modification of obligations such as decrease of interest payable, reduction in the principal amount or postponement of payments.

[7] The Board of the International Organization of Securities Commissions (2012), p. 12.
[8] Augustin et al. (2014), p. 8.
[9] ISDA (2003), p. 30.

When the credit event occurs, the settlement of CDS contracts could be realized in two different ways, either as a cash settlement or as a physical settlement. By physical settlement, the protection buyer transfers the underlying debt obligation to the protection seller in exchange for the face value of the contract. By cash settlement, the protection seller pays the protection buyer the difference between the face value and the market price of the reference obligation, while the buyer remains as the holder of the claim.[10]

CDS contract can be designed in various forms. The two most common types are single-name CDSs and multi-name CDSs. The simplest are single-name CDSs that are written on a single corporation or sovereign state. The more complex form represent multi-name CDSs, which are transferring the credit risk of multiple entities. They occur most frequently as index CDSs that refer to the index of the debtor as the reference entity. There are two most popular CDS indexes: CDX North American Investment Grade Index (includes 125 North American investment-grade companies) and iTraxx (composed of most liquid companies in Europe, Asia, Australia and Japan). Another form of multiple CDSs are tranche CDSs that are written on specific tranches of a given CDS index.[11]

2.2 Uses of CDSs

CDSs are used for three purposes, namely for hedging, speculation, and arbitrage.

1. **Hedging**: The most common use of CDS is for hedging purposes, i.e. for transferring (but not eliminating) of the credit risk of on-balance sheet assets such as corporate debts or mortgage-backed securities for capital relief purposes or for transferring of counterparty exposures. Hedging is in multiple ways similar to traditional insurance coverage.[12]
2. **Speculation**: CDSs are also used to speculate on the creditworthiness of the reference entity. The investor with a positive outlook on the creditability of an entity can sell the CDS protection and as a reward regularly receives premium payments rather than invest in the obligations of the company. On

[10] Augustin et al. (2014), p. 9.
[11] Weistroffer (2009), p. 7.
[12] ECB (2009), p. 10f.

the other hand, if the investor believes that the creditworthiness of the company will decline, he can buy the CDS protection in exchange for a relatively small fee, and if the enterprise defaults, he will receive a compensation payment. The case, when the investor buys the protection without owning an exposure towards the reference entity is referred to as "naked" CDS.

3. **Arbitrage**: CDS are very often used also for arbitrage strategies. One of the examples is Capital Structure Arbitrage, which "exploits the mispricing between a company´s CDS spread and equity price."[13] Normally, there is a negative relationship between the company´s share price and CDS spread. The arbitrageur tries to predict the fair CDS spread. If he believes there is a mispricing and CDS is overvalued, he will sell the CDS and the underlying stock simultaneously. But if he believes that the CDS protection is undervalued, he will buy the CDS, as well as the underlying stock.[14]

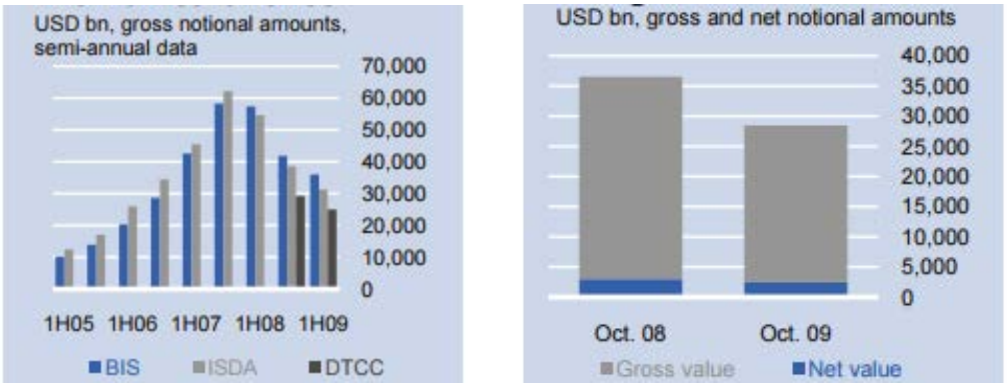
2.3 CDS market – the size and structure

Due to the OTC nature of CDS market, it is quite difficult to measure the size of the CDS market. The data about the CDS market differ from source to source, but the trends are more or less similar, as we can see in Figure 2. The preferred measure of the size of CDS market is the gross national value defined as "*the sum of CDS contracts bought (or equivalently sold) across all counterparties, where each trade is counted once.*"[15] CDSs have experienced from their introduction by JP Morgan in 1994 until the outbreak of the financial crisis in 2007 an exponential growth. At the end of 2007, the gross national amount peaked $58 trillion, but the following years started significantly decline, falling to $25 trillion by the end of 2009 and $12 trillion in early 2016. This decrease in notional amount outstanding was cause mainly by two factors: failure of the major market participants (such as Lehman Brothers and other investment banks) and the trade compression practice, i.e. elimination of all offsetting transactions between pairs of counterparties.[16]

[13] Yu (2006), p. 47.
[14] Wojtowicz (2014), p. 1.
[15] Weistroffer (2009), p. 5.
[16] ECB (2009), p. 15.

Since the existence of offsetting transactions in CDS markets (i.e. market participant is both buyer and seller of protection on the same obligation) is a common practice, the net notional value better reflects the risk born in the CDS market. The net notional value is the "*sum of net protection bought (or equivalently sold) across all counterparties*"[17]. From the Figure 2, we can see that net notional value is less than 10 % of the gross notional value at the end of 2008.

Figure 2: Size of the CDS market



Source: Weistroffer (2009), p. 5.

According to Chen et al.,[18] the CDS market is characterized by low trade frequency and relatively large trade sizes. Trading in single-name CDSs is relatively low, on average five times a day with an average deal size of $5 million for corporate bonds and $25 million for sovereign bonds. By contrast, trading in the CDS indexes is more common, on average 20 times per day and the average trade size is $25 million.[19]

Another characteristic of the CDS market is that the market is concentrated among a few large dealers, who trade extensively among themselves. Based on Fitch´s derivative survey (2010), the top five US CDS dealers were JPMorgan, Goldman Sachs, Morgan Stanley, Citigroup and Bank of America. Moreover, the DTCC database claims that ten biggest CDS dealers were counterparties to 72% of trades in CDS market in April 2009.[20] We can suppose that in the pre-crisis period the concentration was even larger because some major participants such as Lehman Brothers, Bear Stearns or AIG has left the market.

[17] Weistroffer (2009), p. 5.
[18] Chen et al. (2011), p. 10.
[19] The Board of the International Organization of Securities Commissions (2012), p. 19.
[20] ECB (2009), p. 21.

2.4 Advantages of CDSs

Although during the financial crisis a lot of attention was paid to negative features of CDSs, it is also necessary to highlight that these instruments also have a lot of benefits. Stulz mentions three fundamental advantages of these tools: "*they make it easier for credit risks to be borne by those who are in the best position to bear them, they enable financial institutions to make loans they would not otherwise be able to make, and their trading reveals useful information about the credit risk.*"[21]

Traditionally the bank issuing the loan has to keep it in its book and monitor the borrower. But CDSs enabled the banks to separate funding from credit risk[22] as they transfer it to third parties and so can lend the money with less risk. This practice has thus a positive effect on liquidity in the market. The banks are keener to lend, and so the borrowers have greater access to capital at considerably better terms.

Another benefit of CDS contracts is their standardization. As was also mentioned in previous chapters, ISDA developed a model CDS contract, so-called ISDA Master Agreement that serves as a template for all CDS contracts, but the contractual parties can modify it, and so decreases to a large extent the transaction costs of contracting.[23]

And the last benefit, which cannot be forgotten is that CDS spread serves as a proxy to assess company´s credit risk. Before the formation of CDS market, it was exacting to evaluate the peril of each debt. The dealers used for their commercial and accounting purposes their own methods. Therefore, there were established the rating agencies that assess the risk of debtors with their internal models and assign them the ratings. But the problem is that any rating agency can evaluate the debt as efficiently as the market participants.

The information about the risk of each reference entity can be inferred from the corresponding CDS spread. Since this spread reflects the actual market conditions, it has a higher value than the expert´s opinion of one subject. In practice, there is often calculated so-called "implied default probability" of a given company using its

[21] Stulz (2009), p. 3.
[22] Theis (2013), p. 39.
[23] Partnoy, Skeels (2007), p. 8f.

CDS premium. This calculation does not say with which probability the company defaults, but only represents the market consensus about this probability.[24]

However, some criticism has emerged that this information could also have an adverse impact on the market position of the reference entity. In case that the CDS spread is significantly increasing, the credibility of the reference entity will worsen, and this could further deteriorate the market position of the reference entity. This situation is very similar to a bank run when the concerns about the insolvency caused the insolvency.

3. CDSs and potential systemic risk threats

As was highlighted in the previous chapter, CDSs have many positive effects on financial markets, but insufficient regulation and adverse incentives could make from them according to some researchers "*the financial weapons of mass destruction*"[25]. The investigation about the characteristics of CDS users has indicated that CDSs are used mainly by larger banks characterized by "*riskier capital structures, larger maturity mismatches between assets and liabilities, greater loan charge-offs and lower net interest margins*"[26]. And according to Fitch Ratings´ survey[27], 87% of global banks are using CDSs for trading (i.e. profit motives) rather than hedging purposes.

In connection with CDSs and their involvement in the recent financial crisis, the attention is turning to the problems caused by counterparty risk inherent in derivative markets. In case that the failure of one institution with a broad CDSs portfolio triggers losses on its counterparties that result in their default, the counterparty risk could rise to the level of systemic risk. In this context, many researchers have raised critical voices that CDSs exacerbated the recent financial crisis as they created the systemic risk that negatively impacted the stability of the entire financial system.[28]

[24] Cont (2010), p. 37.
[25] Berkshire Hathaway Inc. [retrieved May 15, 2017].
[26] Dias (2015), p. 5.
[27] Fitch Ratings (2010), p. 9.
[28] Dias (2015), p. 11f.

According to Dias, “counterparty *risk is at the center of subsequent systemic effects in the financial system*”[29]. There are two arguments for this statement: Firstly, CDSs create a network of exposures across the global financial system. If one institution in this network defaults, this could further cause the defaults of the other bodies in the chain as the market participants become uncertain about their solvency. Secondly, the default usually occurs suddenly. Therefore the value of CDS jumps by a large amount. The protection seller has to pay unexpectedly millions of dollars to the protection buyer.[30]

Primarily, CDSs are used as a tool for diversification of the financial institution´s credit risk. But as Heyde and Neyer suggest, CDSs could reduce the stability of the financial system during a recession. This is caused by the fact that as long as the CDSs improve the diversification of the banks´ credit risk, they are more prone to invest in riskier assets with higher expected returns than in safe assets with lower returns. Moreover, CDSs create in financial system channels for transmission of contagion as the institutions have contingent claims on each other. Therefore, the failure of one bank could cause severe difficulties to other bodies in the chain that they may not be able to overcome.[31]

Nijskens and Wagner argue that CDSs “*may also increase bank risk in a systemic sense, even if banks' individual risk does not increase*“[32]. This means that the bank may reduce its individual risk by buying protection from another bank, but in effect, the institutions are more correlated with each other and so pose a higher systemic threat to the financial system as it increases the probability that the institutions may jointly default.[33]

3.1 Definition of Systemic risk

In the economics literature, we cannot find a single, universally accepted definition of systemic risk. But there is an agreement that the “*concept of the systemic risk lies in the contagion effect and negative impact on the real economy*.”[34]

[29] Dias (2015), p. 12.
[30] Stulz (2010), p. 81f.
[31] Heyde, Neyer (2010), p. 49.
[32] Nijskens, Wagner (2008), p. 2.
[33] Nijskens, Wagner (2008), p. 3 and Dias (2015), p. 13.
[34] Smaga (2014), p. 4.

In this context, Harrington defines systemic risk as a "*risk of widespread harm to financial institutions and associated spillovers on the real economy that may arise from interdependencies among those institutions and associated risk of contagion. Systemic risk is conceptually distinct from the risk of common shocks to the economy, such as widespread reduction in housing prices, which have the potential to harm large numbers of people and firms directly (i.e., without contagion).*"[35]

3.1.1 "Three Cs" of systemic risk – contagion, connection and correlation

Systemic risk always has three essential features, so-called "three Cs": contagion, interconnectedness, and correlation.[36] Their effect on the financial system was well manifested during the recent financial crisis, what we will closer analyze in chapters 6.2 and 6.3.

Contagion refers to transmission of shock from one institution (or financial instrument, or market segment) to the entire financial market that consequently causes a systemic crisis. Generally, economists distinguish between the following types of contagion that could lead to systemic risk:[37]

1. Asset price contagion: An unexpected event in market forces some market players to sell their assets at lower prices, and so leads to reducing of price and market value of other financial institutions holding comparable assets.
2. Counterparty contagion: The default of one firm can cause financial difficulties to its counterparties that can be further transmitted through financial markets.
3. Uncertainty and opacity of information: Financial difficulties of one company lead to uncertainty about the economic conditions of its counterparties. As a consequence, the market participants stop their trading activities until they receive more information.
4. Irrational contagion: The typical example is a bank run, which occurs when a large number of customers withdraw their deposits. It can usually be explained as panic behavior that turns to insolvency.

[35] Harrington (2009), p. 2.
[36] Scott (2012), p. 16.
[37] Harrington (2009), p. 17f.

Another area of concern regarding systemic risk are the interconnections between the financial institutions. Normally, the links between the entities serve as a tool for diversification of risk, but under crisis conditions these "*may fail to function in their normal ways, resulting in particular institutions´ facing excessive and unexpected risks*."[38] And the last feature of systemic risk is a correlation in exposures of financial institutions, which contribute to the transfer of shock.[39]

3.2 Counterparty risk in CDS market

The counterparty risk refers to the risk that one side of the CDS contract will fail to fulfill its contractual obligations. Concerning this type of risk, it could be recognized three cases (see Table 1 below). Firstly, if the protection buyer defaults, the protection seller will receive no more premium payment and have to find an alternative protection buyer. Secondly, if there is a failure of protection seller, the protection buyer will lose the protection and should replace the contract with a new one at the comparable price. But owing to the market conditions, this is not always possible. And thirdly, if there is a joint failure of both the reference entity and the protection seller, the protection buyer will lose the coverage and will suffer a loss.[40]

Table 1: Credit vs. counterparty risk

Reference entity	Protection buyer	Protection seller	Consequences
X			Orderly settlement
	X		Replacement
		X	Replacement
X		X	Uncovered loss

Source: Weistroffer (2009), p. 11.

At this point, it is necessary to highlight that although credit risk and counterparty risk are conceptually distinct, they interact. The increase in the credit risk of the reference entity has a dual effect – it increases the market value of CDS contract

[38] Acharya (2011), p. 7
[39] Smaga (2014), p. 6ff.
[40] Weistroffer (2009), p. 11f.

for the protection buyer whereas reduces the value for the protection seller. So with the rise of the credit risk of the reference entity simultaneously increase the counterparty risk of the protection seller (i.e. it increases the probability that the protection seller fails to fulfill his contractual obligation).[41]

There are several sources of counterparty risk in CDS market:

1. **The jump-to-default risk** of protection seller refers to a case when an unexpected credit event creates a sudden obligation for the protection seller to pay a large amount of money to protection buyer.[42]
2. **Liquidity risk** arises from the obligation of the CDS seller to post collateral as the market value of the reference entity changes and/or the credit rating of the reference entity and/or of the protection seller changes. At one point, the collateral calls on CDS contracts could exceed the ability of the protection seller to raise additional liquidity and honor its obligations.
3. Another type of risk present in the CDS market is a **wrong-way risk.** It refers to "*the increased correlation in the CDS market between reference entities and sellers of CDS.... [It] occurs when the creditworthiness or credit quality of a CDS reference entity is correlated with the CDS counterpart´s ability or willingness to pay.*"[43] In 2009, six top CDS dealers were simultaneously in the group of top ten non-sovereign reference entities.[44] Therefore, when one large reference entity defaults, this increases the default probabilities of the small group of protection sellers.

3.3 Counterparty risk management techniques

In this chapter, we will discuss the various advanced methods used to limit and manage counterparty risk in CDS market, namely netting, collateralization and downgrade triggers.

[41] Weistroffer (2009), p. 12.
[42] Weistroffer (2009), p. 12.
[43] ECB (2009), p. 26.
[44] ECB (2009), p. 26.

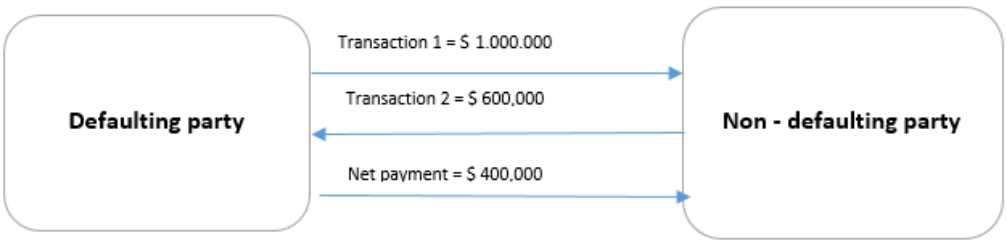
3.3.1 Netting

Netting is a standard practice included in ISDA Master Agreement. It is "*the termination or cancellation of reciprocal obligations, the valuation of terminated obligations and its replacement by a single payment obligation*"[45]. This means that one party aggregates all the trades with a given counterparty to one net amount. One important feature is that not only CDS trades but all OTC derivative transactions (interest rate swaps, equity derivatives and CDSs) under an ISDA Master Agreement with one counterparty could be offset.

In the event of default by one party, the close-out netting takes place. We can illustrate it with the following example: There are two transactions between the defaulting and non-defaulting parties. The transaction 1 has a negative market value of $1 million for the defaulting party and transaction 2 has a positive market value of $600,000 for defaulting party. The close-out netting will be now carried out in three steps:[46]

1. Termination - The non-defaulting party terminates all the outstanding transactions with the defaulting party.
2. Valuation – The determination of replacement cost for each trade.
3. Determination of net balance – The positive values are netted against negative values. The defaulting party has to pay a net obligation of $400,000 to the non-defaulting party.

Figure 3: Close-out netting under Sec. 6 of 2002 ISDA



Source: Based on Corbi (2012), p. 12.

[45] Corbi (2012), p. 10.
[46] Corbi (2012), p. 12.

3.3.2 Collateralization

Another option, also very often employed to reduce counterparty risk is collateralization which uses collaterals as compensation for the losses suffered following the default of the opposite party.[47] In practice, when the parties conclude a CDS contract, they are in equal position. But as the CDS spread starts moving, the position is going to be frequently rebalanced, and the party which is "in-the-money" (i.e. either the buyer or the seller of CDS protection) receives the collateral payment from the counterparty. In case that the credit of the reference entity begins to worsen, the CDS spread will widen and the CDS buyer will become the "in-the-money" party. And hence the counterparty has to post collateral. Contrary, if the credit of the reference entity is improving, the CDS spread will decrease. So, the CDS seller is "in-the-money", and thus the buyer of the protection has to post collateral.[48]

3.3.3 Downgrade triggers

The next technique used to minimize counterparty risk in financial contracts is downgrade trigger. In compliance with this practice, when the credit rating of one party of the contract falls below an agreed level, the counterparty has the right to implement the specific, agreed actions (e.g. termination of all transactions at their market value or posting of cash collaterals) to secure itself against higher counterparty risk. However, as we will see later in chapter 6.2 (Case study of AIG), the rating triggers have appeared in recent years to be rather controversial as they contributed to severe financial difficulties of the already distressed company.[49]

3.4 Transparency issues in pre-crisis CDS market

One of the biggest problems of CDS market was the lack of transparency. This was caused by the fact that OTC derivatives were traded solely over-the-counter, without regulatory oversight and proper recordkeeping. The financial statements of the financial institutions contained only information about the notional value and market

[47] ECB (2009), p. 45.
[48] Wallison [retrieved April 20, 2017].
[49] Parmeggiani (2012), p. 5.

value of CDS contract, but not details about counterparties of the CDS contracts.[50] This showed to be critical in a time of financial distress when it is not enough to know the financial conditions of the direct counterparties, but it is necessary to know the details of the counterparties´ counterparties, likewise the counterparties of the counterparties´ counterparties and so on.[51] The lack of information about the exposures of market participants makes it difficult to manage counterparty risk.

Therefore we can characterize CDS market as a complex web of unknown CDS contracts with interconnected claims. There exists a danger that a non-fulfilment of one claim could trigger a domino effect, i.e. the default of one entity affects not only its counterparties but also all the protection sellers of CDS contracts written on this entity. If the CDS seller cannot absorb the shock and defaults on its arising liabilities, the contagion is further transmitted across the financial system. Additionally, as there is a high concentration in the CDS market, this further contributes to the contagion and systemic risk. A default of one of the few big CDS sellers could trigger a credit event in CDSs, in which this was the reference entity and so could activate the domino effect.[52]

Surprising, from a systemic risk perspective, it is immaterial whether the CDS is naked (i.e. speculative) or not (i.e. the CDS buyer carries the credit risk of the reference entity). But the main thing is whether the protection seller holds enough capital and liquidity to meet all its liabilities in case of a credit event of the reference entity. It follows that the essential is the appropriate risk management of the protection seller.[53]

3.5 Moral hazard

Traditionally, the bank holds the loans it originates, and so maintains the incentive to screen and monitor them. But the problems could occur when the bank secures its loans with CDSs and so loses the stimulus to supervise the borrowers and to sustain a relationship with them. On the other hand, the CDS seller to whom was the risk transferred has no connection with the borrower and so has also no

[50] Gupta (2012), p. 35.
[51] Caballero, Simsek (2009), p. 1.
[52] Cont (2010), p. 38.
[53] Cont (2010), p. 38.

opportunities to predict the difficulties and prevent them. We call this situation as empty creditor problem.[54]

The lender that has secured himself against the credit event with CDS could have even a negative economic interest, i.e. he would have higher profit from the CDS than from fulfillment of insured obligation, and hence would prefer the bankruptcy of the reference entity. It also raises concerns that such creditor could participate in bankruptcy proceedings and negatively influence these to minimize the value of the bankruptcy assets and so maximize the value of CDS. But according to ISDA settlement standards, between the credit event and settlement of CDS is not more than 30 days and it is not probable that during this timeframe the protection buyer can have a significant effect on the value of the bankruptcy estate.[55]

4. CDSs and the financial networks

The pre-crisis period was characterized by the implementation of new business strategies, which substantially changed the topology of the financial networks. The first one, “originate-to-distribute” strategy, has been conducted through securitization and use of derivative products, such as CDSs. On the one hand, this improved the Pareto efficient reallocation of risk, but on the other hand, the complexity of the financial networks began sharply growing as the nodes became larger and infinitely interconnected. As a result, the networks were dense and opaque. The firms were able to diversify their individual credit risk, but overall it reduced the stability of the entire financial sector. The second strategy, diversification of business units, consisted in turning business to highly profitable activities (also so-called “follow-the-leader”), what led to the lack of diversity across the entire financial system. Consequently, the banks´ balance sheets and risk management started looking very similar. And, the two key features of the financial network became complexity and homogeneity.[56]

[54] Bolton, Oehmke (2013), p. 7.
[55] Davi (2008), p. 10.
[56] Haldane (2009), p. 3f.

Traditionally, the completeness of the network was considered as a stabilizing force of the system as it induced the self-regulatory and self-improving mechanism.[57] The pre-crisis studies of contagion, such as that of Allen and Gale[58], had shown that the impact of contagion depends on the completeness of the network of financial claims. A complete network had been regarded as more robust than the incomplete one. But the financial crisis has shown that this assumption is not correct anymore. Four following mechanisms influence the stability of the financial network:[59]

1. **Connectivity**: The relationship between the network connectivity and robustness is affected by three key features:
   a.) The financial network is "robust-yet-fragile". To a certain extent, the connections within the network serve as a risk sharing instruments, and therefore connectivity generates stability of the financial system. But if the degree of interconnectedness exceeds a certain level (i.e. a tipping point), the interconnections will start to transmit the shocks across the system. In this case, the connectivity so creates fragility of the financial system.
   b.) The connection within the network exhibit a long tail. This means that the network is characterized by a larger than expected number of nodes with a large number of small links and a small number of large links. For this type of layout, it is characteristic that it is quite resistant against random disorders but vulnerable to attacks on its center.

   We could observe the unveiling of this property in connection with the recent financial crisis. Until the outbreak of the crisis, the financial network seemed robust despite the frequent occurrence of the random attacks. But what appeared as critical, were the shocks to the large and/or interconnected financial institutions such as Bear Stearns, AIG or Lehman Brothers. These have caused serious systemic issues.
   c.) The financial network exhibits the "small world" properties. Therefore "*the average number of links separating any two nodes is short*"[60], and some nodes (i.e. the key institutions interconnected with many others) tend to cluster together. Concerning the network stability, this type of network

[57] Haldane (2009), p. 4f.
[58] Allen, Gale (2000), p. 1.
[59] The explanation of the mechanisms is based on Haldane (2009).
[60] Peltonen (2013), p. 11.

structure is prone to transform local problems into network-wide disturbances.

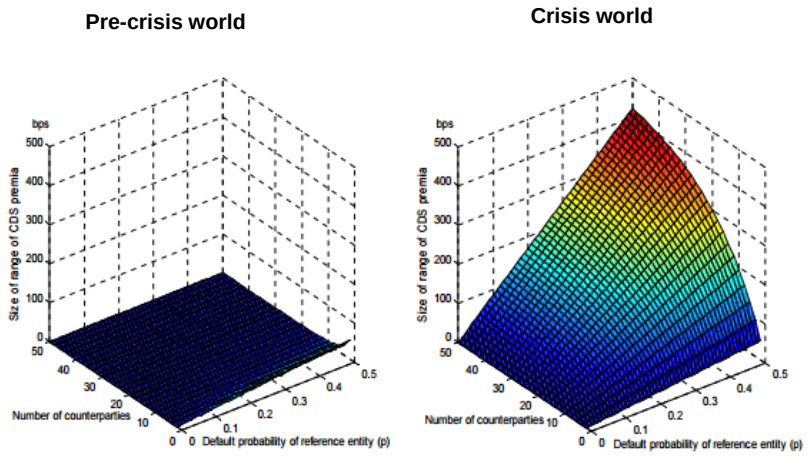
2. **Feedback**: Threat of contagion leads to behavioral responses of institutions. Banks begin to hoard money instead of lending it. Subsequently, some organizations find them unable to finance their activities and therefore they are forced to start selling their toxic assets. In effect, the prices of these assets decline and the interconnections between the financial institutions spread the disease to other institutions and thus increases the fragility of the financial system.
3. **Uncertainty**: Financial network consists of chains of obligations. In the case of CDSs, these chains are opaque and very difficult to monitor. No one knows who is at the end of the chain and is really going to bear the risk. In a time of financial distress, this causes a high degree of uncertainty or even panic and thus has a far-reaching impact on network stability and pricing of financial instruments (in this case, on the pricing of CDSs).

   To explain this issue in more detail, we can use a simple example: If Bank A buys CDS insurance from Bank B against the default of company C, there is a high degree of counterparty risk, i.e. the risk that Bank B would default and Bank A would lose the protection. If this would be a standard contract, not CDS, the Bank A would simply monitor Bank B. But as was already many times mentioned, Bank B has itself besides Bank A also many other counterparties. And each of these counterparties has many other counterparties. Therefore, it is impossible to monitor the risk of all these companies. Thus, Bank A has serious concerns about the real network architecture as the counterparty exposures are unidentifiable and immeasurable. We call this situation as Knightian uncertainty.

   In the condition of Knightian uncertainty, CDSs prices cannot be precisely determined. They are expressed as an interval of CDS spreads, i.e. "*a metric of uncertainty, and hence distortion, arising from different network structures*"[61].

[61] Haldane (2009), p. 8.

Figure 4: CDS premia and network uncertainty



Source: Haldane (2009), p. 24.

Figure 4 demonstrates the pre-crisis and crisis situation in the CDS market. In the pre-crisis world, the Bank´s B default probability and the uncertainty around this probability are low. A large number of counterparties has only a minor effect on the range of CDS spread.

A very different situation is to observe during the crisis. The Bank´s B default probability and the uncertainty around it have significantly increased. Additionally, the network dimensionality has had a material effect on CDS spread and created massive pricing distortions. As a consequence, together with the number of counterparties has been increasing the range of CDS spread.

4. **Innovation**: The complexity of the financial network has also arisen from the introduction of new financial products, structured finance instruments such as asset-backed securities, residential mortgage-backed securities, credit default swaps or collateralized debt obligations. These have led to a further increase of dimensionality of the financial network, and thus to amplification of network fragility.

5. US Housing Bubble

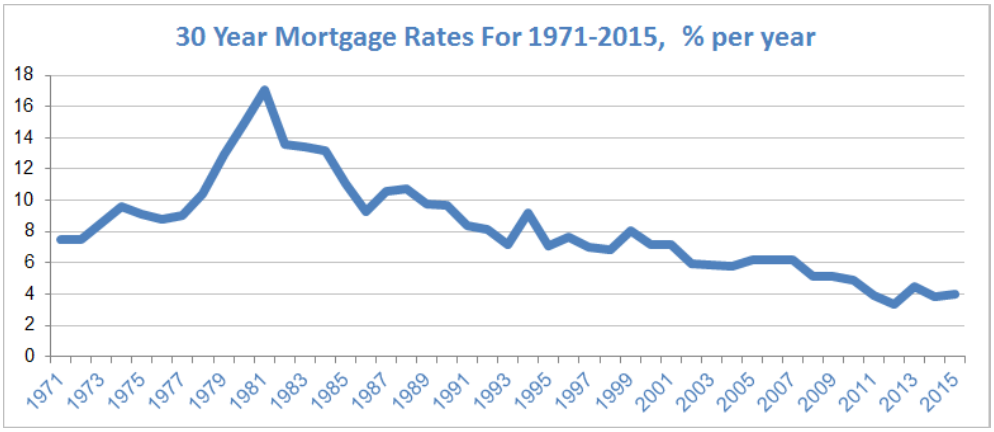
The recent financial crisis cannot be analyzed without first exploring the US housing bubble. It is broadly accepted that the bursting of this bubble was the trigger of the resulting crisis in the financial markets.

In 2002, the US president George W. Bush introduced the "American´s Homeownership Challenge". The goal of this initiatives was to increase the house ownership for the low-income earners and so bolster the U.S. economy after the recent negative events - bursting of the Dot.com bubble and terrorist attacks of September 2011. To make mortgages more available, lenders offered new mortgage products, e.g. interest only mortgages, adjustable-rate mortgages or piggy-back mortgages. Their common feature was that they required low initial monthly payments to attract more borrowers.[62]

5.1 Primary causes of the Housing Bubble

In the following subchapters, we are going to analyze in more details the four major causes of the US housing bubble according to Holt (2009), namely: low mortrgage-interest rates, low short-term interest rates, relaxed standards for mortgage lending and irrational exuberance. He stated that "*the combination of all four causes created a type of "perfect storm" causing the housing bubble to be extreme and the resulting credit crisis to be severe*."[63]

Figure 5: US mortgage interest rates



Source: 30 Rates Monitor [retrieved April 30, 2017]

[62] Holt (2009), p. 121ff.
[63] Holt (2009), p. 128.

5.1.1 Low mortgage interest rates

The increase in homeownership was further provided by low mortgage interest rates. The USA was able to keep these rates low by a massive inflow of money from abroad, mainly from China, Japan, Brazil or the United Kingdom. The investors from these countries believed that the investments are low risk and have good returns. They preferred either Treasury bond or those who had been seeking for higher yields, chose mortgage-backed securities.[64]

The mortgage interest rates reached a maximum of 18 percent in 1982. In the following thirty years, the interest rates were steadily falling, reaching in 2002 only 6 percent and maintaining the low levels for the next years (see Figure 5).

5.1.2 Low short-term interest rates

Another important factor that contributed to the housing bubble were low short-term interest rates. They were moving around 2 percent and less in 2001 – 2004. These low-interest rates contributed to the increasing use of adjustable rate mortgages (i.e. mortgages with interest payments tied to federal funds rate), which made the homeownership available also for those, who cannot otherwise afford. Moreover, low-interest rates also enabled to increase the leverage of financial institutions. Investors seeking higher profits increasingly borrowed money at low short-term interest rates and invest this in mortgage-backed securities. [65]

5.1.3 Relaxed standards for mortgages

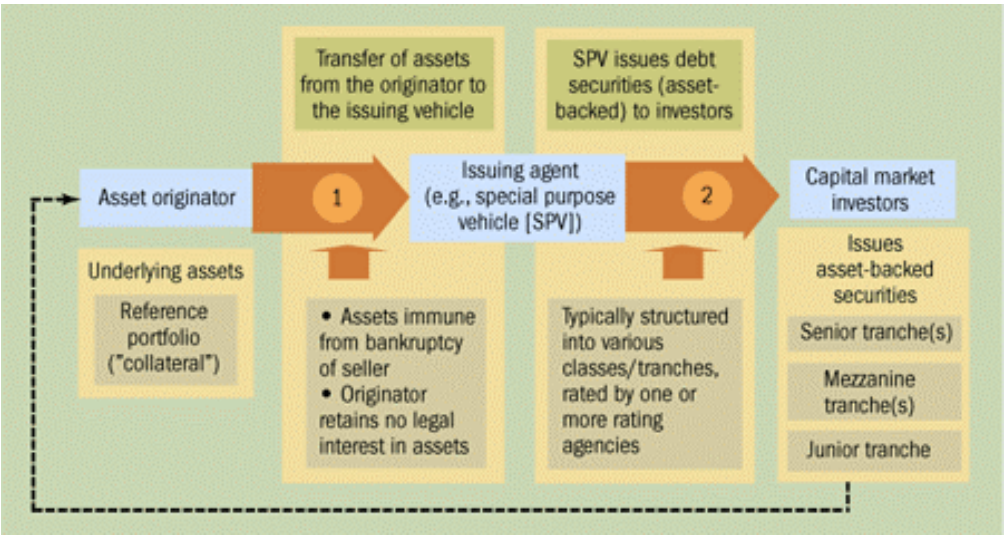
To the developing of the housing bubble have further contributed the relaxed standards for mortgages. The mortgages were in large extent provided to low-income borrowers. Therefore the financial institutions were forced to decrease the established standards. As there was a great competition among the mortgage providers, which originate the mortgages with the aim to sell them further to

[64] 30 Rates Monitor [retrieved April 30, 2017].
[65] Holt (2009), p. 122f.

investment banks, they did not care much about the creditworthiness of the borrowers. [66]

We call the practice, where the lenders bundle the loans and sell them to securitizer (i.e. to so-called SPVs) as originate-to-distribute securitization model. The Figure 6 below illustrates the mechanism of securitization. During the housing bubble, the SPVs were either government sponsored enterprises (e.g. Federal National Mortgage Association - so-called Fannie Mae) or private entities established to buy and then resell the assets.[67] Securitizers re-bundled the received mortgages into Mortgage Backed Securities (MBSs), that were further sorted in tranches based on seniority. Consequently, each tranche received the rating from the rating agency. The top, super senior tranche with the highest rating ("A tranche") had the lowest risk comparing to other tranches, but in exchange also the lowest interest rate. Then followed the lower rated tranches with a higher level of risk and higher interest rates. Finally, the MBSs were sold to investors. Usually, the original lenders collected the principal and interest payments from borrowers and in exchange for a little fee transferred these to the SPV, which passed them subsequently to investors.[68]

Figure 6: The securitization process



Source: Jobst (2008), p. 48.

[66] Holt (2009), p. 124f.
[67] Senarath (2014), p. 16.
[68] Jobst (2008), p. 48f.

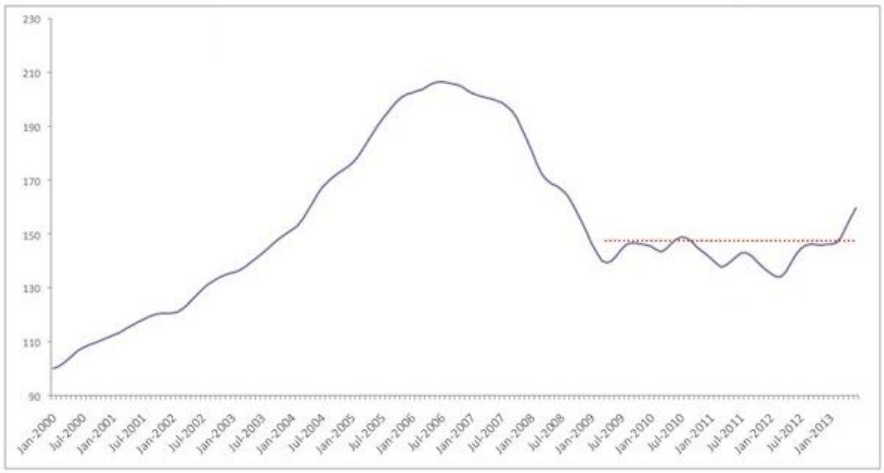
There is an agreement in the literature that securitization has been "*a way for financial institutions and corporations to find new sources of funding—either by moving assets off their balance sheets or by borrowing against them to refinance their origination at a fair market rate. It reduced their borrowing costs and, in the case of banks, lowered regulatory minimum capital requirements.*"[69] But on the other hand, securitization was also a machine that maintained the high real estate prices and so contributed to the fueling of the housing bubble. Moreover, with the relaxing of mortgage standards, there were with increasing frequency also securitized subprime mortgages caring a high probability of default. In 2006, subprime loans accounted for 20 percent of all loans granted. Moreover, more than half of all loans provided (ca. 58 percent) had risky contract clauses such as interest-only payments for the agreed time, fines for early redemption of mortgages and low documentation requirements.[70]

5.1.4 Irrational exuberance

And the last factor, which contributed significantly to the housing bubble, was the **irrational exuberance**. This phrase could be explained as "*a heightened state of speculative fervor*"[71]. All the market players acted as they believed that the home prices would never fall, and so created the bubble. In Figure 7 we can see the development of house prices in the USA. From 1997 to first half of 2006 the house prices were steadily growing. As a result, people started increasingly buying new houses, mortgage lenders were issuing more and more (subprime) mortgages, investment banks continually offered new MBSs that received high ratings from rating agencies, investors increasingly invested in these securities that they considered as not very risky and insurance companies such as AIG offered protection in the form of CDSs on these loans. These all would be well function if the house prices would not start decreasing in the 2nd quarter of 2006.[72]

[69] Jobst (2008), p. 49.
[70] Trehan [retrieved May 1, 2017].
[71] Shiller [retrieved May 2, 2017].
[72] Holt (2009), p. 125f.

Figure 7: S&P/Case-Shiller 20-City Composite Home Price Index



Source: Maierhofer [retrieved April 06, 2017]

5.2 The bursting of the housing bubble

When the house prices started to fall, subprime borrowers found themselves unable to repay or refinance their mortgages. Therefore the foreclosure rates and so the number of homes available for sale began increasing. This further pushed the house prices down, leading to a negative impact on MBSs that were losing their value.[73]

With the sharply decreasing home prices, the housing bubble burst and have brought about far-reaching consequences for all the involved parties, i.e. homeowners, mortgage lenders, investment banks, investors and companies issuing CDSs. And so, the crisis hit the entire financial system.

6. The role of CDSs in the Great Financial Crisis

The financial crisis, which burst out in 2007, has significantly staggered the world financial markets and led to global and exceptionally strong economic downturn. Therefore, after the situation has started to calm down, the US government created the Financial Crisis Inquiry Commission and assigned it a task to investigate the causes of the crisis. To this purpose, the Commission inspected a large number of

[73] Holt (2009), p. 126f.

studies created by professionals from government agencies and congressional committees, and by academics and journalists. Further, it questioned approximately 700 witnesses and conducted public consultations. And finally, after issuing its final report in January 2011, the Commission completed its operations.[74]

FCIC, as well as many others, came to the agreement that the credit derivatives and in particular CDSs took on an important role in the recent crisis. Therefore, in the following subchapters, we will first introduce the attitude of FCIC to the role of CDSs in the crisis. And later, to better understand the risk a CDSs can pose to the rest of financial system, we will analyze the impact of their use by two big players in CDS market - AIG and Lehman Brothers.

6.1 The view of the Financial Crisis Inquiry Commission

FCIC has defined three ways in which CDSs contributed to the financial crisis:[75]

1. **CDSs "fueled the mortgage securitization pipeline"[76]:** Insurance companies sold to a large extent protection on newly issued MBSs and so helped to sustain the flow of money for new mortgages issuance. This kept the house prices rising, and so further fueled the housing bubble.
2. **CDSs have played a key role in synthetic collateralized debt obligations (CDOs):** Synthetic CDOs were in their substance only bets on MBSs. They consisted of a set of CDSs agreements referenced on MBSs. Even, financial institutions used these instruments to bet on mortgages that they issued. But what showed as critical and magnified the losses when the housing bubble burst was that one security could be referenced multiple times. FCIC has stated that in the period from July 2004 to May 2007 Goldman Sachs issued synthetic CDOs in the total amount of $73 billion consisted of bets on 3400 securities – thereof 610 securities were used at least twice.
3. **The opacity in the derivative market** exemplified by "the existence of millions of derivatives contracts of all types between systemically important financial institutions—unseen and unknown in this unregulated market—

[74] FCIC (2011), p. XI f.
[75] FCIC (2011), p. XXIV f.
[76] FCIC (2011), p. XXIV.

added to uncertainty and escalated panic…"[77]. The default of one big player in CDS market could threaten a large part of the entire financial system.

As the FCIC, also many other sources stated that one of the major causes of the financial crisis was the practice of securitization, which produced a massive problem expansion through the entire financial markets. Securitization enabled the financial institutions to transfer the loans from their financial statements and to pool the assets and sell them to an issuer, i.e. SPV. SPV, in turn, created from these assets tradable securities (CDOs) and sold them to the investors who so acquired the rights on profit from these loans. CDOs often received credit ratings from rating agencies that were better than ratings of underlying loans. Probably, the rating agencies overestimated the importance of diversification of risk[78] and dismissed the systemic risk that is non-diversifiable. Subsequently, on this CDOs were extensively issued CDSs that transferred the credit risk of CDOs on third parties.

6.2 Case study AIG

Before the outburst of the financial crisis, AIG was the largest multinational insurance corporation in the world, present in more than 120 countries worldwide, holding $1.06 trillion assets and generating annual revenue of about $100 billion.[79] The company had four primary business segments:

- General insurance: property/casualty insurance and commercial/industrial insurance;
- Life insurance and Retirement services: individual and group life insurance, retirement services and annuities;
- Financial services: capital markets, consumer finance, and aircraft leasing;
- Asset Management: Investment advisory, brokerage, and private banking.

The troubles of all financial institutions during the crisis had been arising from their exposure to real estate market. AIG was no exception. As we can see from Table 2, all business divisions suffered losses, but the largest came from Financial

[77] FCIC (2011), p. XXV.
[78] Shadab (2010), p. 412.
[79] McDonald, Paulson (2014), p. 7.

services segment – more precisely from a subsidiary AIGFP and from Life insurance segment and its securities lending business.

Table 2: AIG Financial Results by operating segment

	Years Ended December 31,		
	2008	2007	2006
	(millions of dollars)		
Operating Income (loss):			
General insurance	(5,746)	10,526	10,412
Life Insurance & Retirement Services	(37,446)	8,186	10,121
Financial Services	(40,821)	(9,515)	383
Asset Management	(9,187)	1,164	1,538
Other	(15,055)	(2,140)	(1,435)
Consolidation and eliminations	(506)	722	668
Total	(108,761)	8,943	21,687

Source: Based on AIG (2008), p. 71.

6.2.1 AIGFP and its Credit Default Swap Portfolio

Before the financial crisis, AIGFP had extensively issued and traded CDS on mortgage-related bonds. But in contrast to other CDS dealers, which used CDSs as an instrument for hedging their exposures and therefore held both long and short positions, AIG was almost solely CDS seller. Usually, AIGFP had underwritten the protection on the "super senior" risk layer of the loan or debt portfolios. That means that AIG will suffer losses after breaking the "attachment point", i.e. the first loss level encompassing equity layer and other layers rated from BBB to AAA.[80] Their models anticipated with 99,85% confidence level[81] that there would be no credit event.

Based on the Form-10 K reports, AIG´s CDS portfolio consisted of four types of asset classes: corporate loans, prime residential mortgages, corporate debt/collateralized loan obligations and multi-sector CDO.

[80] AIG (2008), p. 132.
[81] Senarath (2014), p. 26.

Table 3: AIG´s CDS Portfolio and the unrealized valuation loss

	Net Notional Amount (billions of dollars)		**Unrealized Valuation Gain (Loss)** (billions of dollars)	
	FY		FY	
	2007	**2008**	**2007**	**2008**
Corporate loans	230	126	-	-
Prime residential mortgages	149	107	-	-
Corporate debt/Collateralized loan obligations	70	50	(0)	(2)
Multisector CDO	78	13	(11)	(26)
Total	527	296	(11)	(28)

Source: Congressional Oversight Panel (2010), p. 218.

Corporate loans and prime residential mortgages were written for European financial institutions to obtain regulatory capital relief and thus reducing their minimum capital requirements.[82] As they did not generate any significant losses, we can conclude that these did not present a high risk for the company. It proved that most of the danger of AIG have lied in multisector CDSs written on prime, Alt- A and subprime residential mortgage-backed securities (RMBS), commercial mortgage-backed securities (CMBS), collateralized debt obligations (CDOs) and other asset-backed securities (ABSs).[83] In 2008, the AIGFP´s unrealized valuation losses from this portfolio reached $26 billion.

At the end of 2007, when the conditions in the financial markets were considerably deteriorated, and the AIG´s multi-sector CDO portfolio suffered an $11 billion unrealized valuation loss, the company still believed that "the credit risk from its CDS portfolio was virtually non-existent given the super-senior credit ratings of the reference securities."[84] According to the Company, there was "no probable and reasonably estimable realized loss in this portfolio at December 31, 2007."[85]

In some extent, the prediction of AIG could be right, as any credit event has occurred until the end of 2008. But what the company failed to predict were losses from collateral calls that appeared to be lethal for AIG.[86]

[82] AIG (2007a), p. 122.
[83] AIG (2008), p. 139.
[84] Congressional Oversight Panel (2010), p. 35.
[85] AIG (2007a), p. 124.
[86] Congressional Oversight Panel (2010), p. 36.

In OTC market, collaterals are used to secure against changes in market value. The basic rules for their use are described in a credit support annex (CSA), which is an appendix to the ISDA Master Agreement. The contractual parties are free to modify them.

AIG´s collateral payments depended on AIG's credit ratings, the rating of the reference obligations and any further decline in the market value of the relevant reference obligations.[87] Usually, they differed from contract to contract, but the collateral trigger due to a decrease in market value of reference obligation above an agreed threshold seems to be the most frequent case.

Here we show a few example of real collateral practices in AIG for credit transactions documented in December 2007:[88]

- With **Bank of Montreal**, AIG had executed nine transactions with a total notional amount of $1.6 billion. There was agreed none threshold, i.e. collateral payments could be triggered by each change in market value of reference obligation.
- With **Barclays**, the company had executed five transactions with a total notional value of $1.5 billion plus €1.2 billion. AIG agreed to make collateral payment if decline in market value of reference obligation exceeds a threshold of "7% as long as AIG is rated AA/Aa and Reference Obligation is rated at least in the Aa/A2 category; the Threshold is reduced based on a matrix that takes into account lower ratings of AIG and/or the Reference Obligation"[89].
- With **Rabobank**, AIG had six transactions in the total notional value of $1.1 billion. No collaterals were required „as long as either (i) AIGFP is rated at least A2/A and Reference Obligation is rated Aaa/AAA or (ii) AIGFP is rated at least in the AA category"[90].

In 2007, the deterioration of market conditions caused the decrease in the market value of reference CDO portfolios and with this connected downgrade in ratings of

[87] AIG (2009), p. 148.
[88] AIG (2007b), p. 1.
[89] AIG (2007b), p.1.
[90] AIG (2007b), p. 5.

these portfolios. As a result, the first collateral calls were triggered. (Table 4 provides an overview of collateral postings from Q4 2007 to Q3 2008 in respect to AIGFP´s CDS portfolio). And so the troubles of AIG started to worsen, AIG was unable to meet its obligation from collateral calls. This resulted in a downgrade of AIG´s credit rating to AA- level by S&P in Mai 2008 and further downgrade to A- level in September 2008 that led subsequently to an unprecedented liquidity crisis. On September 16, 2008, the Federal government decided to bailout AIG as they found it as too interconnected to fail.

Table 4: Collateral posting with respect to AIGFP´s CDS portfolio from Q4 2007 to Q3 2008

	Q4 2007	Q1 2008	Q2 2008	Q3 2008	Q4 2008
	(millions of dollars)				
Regulatory capital	-	212	319	443	1,287
Arbitrage – multi-sector CDO	2,718	7,590	13,241	31,469	5,129
Arbitrage - corporate	161	368	259	902	2,349
Total	2,879	8,170	13,819	2,814	8,765

Source: AIG (2008), p. 146.

6.2.2 AIG´s Securities Lending Business

During 2008, a significant portion of losses of AIG also arisen from its securities lending business conducted through a subsidiary AIG Global Securities Lending on behalf of AIG´s insurance companies.[91] Securities of AIG´s insurance companies, usually corporate bonds, were loaned to banks and brokerage firms in exchange for cash collateral. Since as the securities lending contracts can generally be terminated on demand, the securities lenders used to invest the cash collaterals in short-term liquid securities. However, to maximize its profit, AIG chose another way. The company invested a significant portion – ca. 65% (for details see Table 5 below) of its collaterals received through its securities lending business in RMBS.[92]

[91] McDonald, Paulson (2014), p. 10.
[92] Congressional Oversight Panel (2010), p. 43.

Table 5: The composition of the securities lending invested collateral by credit rating at December 31, 2007

(millions of dollars)	AAA	AA	A	BBB not rated	Short-term	Total
Corporate debt	1,191	9,341	3,448	160	-	14,140
Mortgage-backed, asset-backed and collateralized	47,180	2,226	22	82	-	49,510
Cash and short-term investments	-	-	-	-	12,012	12,012
Total	48,371	11,567	3,470	242	12,012	75,662

Source: AIG (2007), p. 108.

But as the conditions in US housing market deteriorated, and home prices were continuously declining, RMBS were also downgraded. In September 2008, as the problems in AIG intensified, the securities borrower began to terminate the contracts and required the redemption of collaterals in the total value of $24 billion between September 12 and September 30, 2008. However, AIG was unable to meet the demand through the sale of RMBS due to the fall in their prices. Moreover, the situation was aggravated by the simultaneous liquidity demand from AIGFP´s CDS portfolio.[93]

6.2.3 Did CDSs play a role in AIG near-failure?

The FCIC in its report concluded that "AIG was so interconnected with many large commercial banks, investment banks, and other financial institutions through counterparty credit relationships on credit default swaps and other activities such as securities lending that its potential failure created systemic risk. The government concluded AIG was too big to fail and committed more than $180 billion to its rescue. Without the bailout, AIG's default and collapse could have brought down its counterparties, causing cascading losses and collapses throughout the financial system."[94] Further, they stated that „AIG failed and was rescued by the government primarily because its enormous sales of credit default swaps were made without putting up initial collateral, setting aside capital reserves, or hedging its exposure -

[93] Congressional Oversight Panel (2010), p. 43ff.
[94] FCIC (2011), p. 352.

a profound failure in corporate governance, particularly its risk management practices."[95]

In contrast with the FCIC statement, there is also another view of proponents of CDSs, which argue that CDSs were not the cause of AIG´s failure. If AIG had failed and had not be rescued by the Government, the protection buyers would have had to obtain a replacement coverage simply. It´s sure that it would be quite costly, but as has been shown by Lehman, there is no reason why should we expect that these institutions would fail together with AIG. Moreover, it is necessary to highlight once again the fact that AIG did not fail directly due to its CDS portfolio. At this time, there were no credit events that would trigger the payment obligations. The company failed because it did not have enough cash to meet its obligations from collateral calls. And another important fact is that almost half of all the collateral calls came from its securities lending business.[96] Therefore, blaming CDSs for all the mess would be unfair. AIG did not have enough cash for the collateral calls because it did not hold sufficient capital reserves to cover unexpected losses.

As the problems of AIG were getting worse and worse, the counterparties required more and more collaterals. If AIG had gone bankrupt under these conditions, the protection buyers would have had probably enough cash from the already received collaterals to cover a substantial part of the incurred replacement costs. And if not, the losses would not have been so big to create a systemic breakdown. But there was also another problem with the AIG´s CDS portfolio. As we already have seen in Table 4, much of the collateral calls were triggered from AIG´s multi-sector CDO portfolios. As the real-estate market collapsed, the market value of CDOs significantly declined. So, if AIG had not been rescued, the protection buyers would not have been able to find a new protection and the risk from these instruments would have been transferred back to them. But the incurred losses would have been purely accounting losses as the CDOs would have been returned on the balance sheets of the protection buyers.[97] So once again, it is highly unlikely that failure of AIG would have caused huge losses to its counterparties.

[95] FCIC (2011), p. 352.
[96] Wallison (2015), p. (n.d.).
[97] Wallison (2013), p. 416.

This assumption was also later verified when the counterparties of AIG were revealed. The AIG´s largest counterparty was Goldman Sachs with the total amount of the outstanding insurance contracts of $12,9 billion and the other big counterparties were Société Générale ($11.9 bn.), Deutsche Bank ($11.8 bn.), Barclays ($7.9 bn.), Merrill Lynch ($6.8 bn.), Bank of America ($5.2 bn.) and Citigroup ($2.3 bn.)[98] As Goldman Sachs confirmed, its losses would have been immaterial, if AIG had failed.[99] This was due to the fact Goldman had received a significant amount of money from the collateral calls and furthermore it had also hedged its position by buying CDS insurance against AIG´s potential failure. As was revealed, the losses of the other financial institutions would have been negligible too. The collateral shortfall, i.e. the cost of a default expressed as the difference between the collateral call and collateral posted by the protection seller, was in all the cases not higher than 10% of the protection buyer´s equity and therefore should have been easily coped with the incurred losses.[100]

In reality, the problem of AIG was not CDS portfolio as such, but the fact that it did not hedge CDS exposures, i.e. it was a pure seller of CDS protection. All the other significant financial institution had more or less balanced books and did not suffer after all any major losses from their CDS positions. Hence it is highly probable that if AIG had hedged its CDS positions, it would have had enough money from its counterparties to settle the collateral obligations.[101] Therefore, the main problem of AIG were not CDSs, but rather a set of more complex aspects such as failure of company´s risk management practices, poor oversight and monitoring, and problems with company´s leadership practices.[102] The main figure beyond these controversial practices was the former officer of the AIGFP, J. Cassano. He was well-known by his autocratic managerial style, permanently refusing to accept any kind of discussion or criticism. His greed for profit led to significant underestimation of risk from excessive sale of CDSs on securities of poor quality.[103] Even one year before the failure of AIG, at the time the financial markets were considerably hit by the bursting of the housing bubble, Cassano did not see the approaching danger for

[98] MacIntosh, Beattie [retrieved May 25, 2017].
[99] Edmonston [Retrieved May 25, 2017].
[100] McDonald, Paulson (2014), p. 23.
[101] Wallison (2015), p. (n.d.).
[102] Congressional Oversight Panel (2010), p. 46.
[103] Xinzi (2013), p. 6.

AIG. During the conference call on August 5, 2007, he expressed no worries about the CDS portfolio; he literally said: “It is hard for us, without being flippant, to even see a scenario within any kind of realm of reason that would see us losing one dollar in any of those transactions.”[104]

Based on the facts mentioned above it is undeniable that CDSs played a big role in the failure of AIG, but for sure they were not the only cause of the company´s big problems. Moreover, it has later shown that the effect of CDSs on its counterparties would not have been so catastrophic if AIG had been allowed to fail. But this was not clear at that time. In fact, there was a high uncertainty in the financial market as no one knew the exact CDS exposures between the AIG and its counterparties, as well as the extent in which these exposures were hedged.

Retrospectively, the case of AIG has shown that the most dangerous default in the CDS market is not the default of the CDS seller (in this case AIG), but the failure of the reference entities on which the protection is provided. If there had been, simultaneously or before the default of AIG, failures of several reference entities, this would have caused a systemic breakdown. So, from the point of view of the systemic stability, the critical is not the amount or the notional value of the CDS contracts written by the protection seller, but whether the defaults of reference entities cause significant cash losses.[105] Based on this we can conclude that the US government rescue AIG not because it was a large net protection seller, but because it was a reference entity in many CDS contracts. This suggestion was also confirmed by the fact, as Goldman Sachs confirmed, that it held hedged CDS exposures (i.e. Goldman Sachs had bought a significant amount of CDS protection on AIG) and therefore the failure of AIG would have caused immaterial losses to Goldman. Moreover, further evidence has been provided by E. Dinallo, superintendent of NY State Insurance Department, in Senate testimony: “…*we had no idea how much in swaps had been written on AIG itself or by whom. That meant we did not know what the broader effect of an AIG bankruptcy would be*.”[106]

[104] Morgenson [retrieved May 25, 2017].
[105] Wallison (2013), p. 416.
[106] Simon [retrieved May 26, 2017].

6.3 Case study Lehman Brothers

Before its bankruptcy filing on September 15, 2008, the Lehman Brothers Holdings Inc. was the fourth largest investment bank in the U.S. that was operating globally. The bank´s business was divided into the three core business segments, namely capital markets, investment banking and investment management.

The bankruptcy of Lehman is considered as the biggest in the US history and as an event "*who changed the rules of the so-called game of being too big, to fail.*"[107] There are many voices that the bankruptcy could have been predicted if the market participants had closely analyzed the company´s financial statements of cash flow from 2005 – 2007. These were showing many signs of danger such as excessive investments in financial instruments, reliance on external sources of finance to counterweight the operating deficits or worsening of liquidity situation throughout 2005-2007.[108]

In general, there was no one particular cause of the crisis by Lehman, but rather a complex of failures that jointly contributed to the default of the company. As well as by other institutions, the source of problems lain in the housing bubble and with this connected securitization. Lehman engaged in a "vertically integrated" model[109], what means that it was involved in every step of the securitization process; from originating the mortgages, pooling them and issuing tradable securities to selling securities to capital market investors. To increase its profit, Lehman acquired some residential mortgage loans originators such as Aurora Loan Services or BNC Mortgage that provided in large extent also mortgages to subprime borrowers.

In March 2006, Lehman started implementing an aggressive growth strategy, "Global Strategy Offsite" that comprised of "a shift from "moving" or securitization business to a "storage" business, in which Lehman would make and hold longer-term investments."[110] This strategy is much riskier and includes a high leverage. In summer 2006 the house prices started to decline, what had a negative impact on the number of sold houses in the USA. Despite, Lehman further continued in the massive origination of subprime loans and subsequent securitization. But in contrast

[107] Latifi [retrieved May 30, 2017].
[108] Latifi [retrieved May 30, 2017].
[109] FCIC (2011), p. 89.
[110] FCIC (2011), p. 177.

to previous years, it began to hold the issued mortgage-related assets as investments. For illustration, these investments accounted for $67 billion in 2006 and $111 billion in 2007. The firm continued in this trend of purchasing mortgage-backed assets till the end of the first quarter of 2008.[111]

The common measure of the risk taken by an institution is the leverage; i.e. asset-to-equity ratio. For Lehman, the leverage ratio was until 2006 more or less stable, but with implementing the new growth strategy in 2006, the ratio has considerably increased (see Table 6). This high-leverage, high-risk business model[112] was not specific only to Lehman, but also the other investment banks were using a similar strategy to maximize their profits. Not surprisingly, the high leverage level of financial institutions became one of the factors that contributed to the crisis.[113]

Table 6: Lehman´s Gross Leverage Ratios between 2004 and 2007

(millions of dollars)	**2007**	**2006**	**2005**	**2004**
Total assets	691,063	503,545	410,063	357,168
Total equity	22,490	19,191	16,794	14,920
Leverage ratio	30,7%	26,2%	24,4%	23,9%

Source: Based on Lehman Brothers Holdings Inc. (2007), p. 30.

With the deterioration of the situation on the housing market, Lehman was under pressure to decrease its leverage to avoid the rating downgrade. The company had two options, either to raise equity or to sell its assets. In January 2008, the firm had decided to reduce its exposure to the real-estate sector. However, it showed to be very difficult under the actual market prices of real estate. Lehman would have so incurred massive losses on the sold assets, as well as would have sent a negative message to its investors about the value of the remaining assets.[114]

To finance the excessive investing in the mortgage market, Lehman was reliant on short-term financing, mainly on repos and commercial papers. This strategy is generally very profitable, but in the time of crisis could create an effect similar to a bank run, when rumors about the bank´s solvency cause that lenders withdraw the

[111] FCIC (2011), p. 177.
[112] Wiggins, Piontek, Metrick (2014), p. 6.
[113] Wiggins, Piontek, Metrick (2014), p. 6.
[114] Wiggins, Piontek, Metrick (2014), p. 6.

funds and the bank would face a liquidity dry-up. Therefore, for Lehman, it was crucial to sustain investor and market confidence.

Repo is “essentially a short-term loan that is secured by collateral delivered to the lender by the borrower. The borrower agrees to repurchase the collateral when it repays the loan.”[115] It helped Lehman to raise enough money to secure its continuing operation. In February 2008, Lehman´s repo agreements accounted for $230 billion and in May 2008 $188 billion[116]. The majority of repos, ca. 80%, were agreed with only ten counterparties. In contrast, the repo funding of Bear Stearns was at the time of its collapse only $50 - $80 billion.[117]

As the conditions in the financial markets and in Lehman were continuously deteriorating, Lehman decided to use in the days before the reporting deadlines “Repos 105” transactions. These are characteristic for the obligation of the borrower to provide collateral in extent not less than 105%. In contrast to the traditional repo agreements that are treated as “financings”, these contracts are considered as “sales”. Therefore, Lehman could through using these instruments remove a significant portion of assets from its balance sheet (these assets are used as collaterals delivered to the lenders) and with the borrowed cash could repay the liabilities. This strategy enabled Lehman to decrease its leverage and balance sheet size and so “*create a materially misleading picture of the firm’s financial condition in late 2007 and 2008*“[118]. Despite Lehman removed from its quarterly and annual reports always ca. $50 billion, it was not there disclosed.

In March 2008, when the Bear Stearns collapsed, many predicted that Lehman would be the next to default. This was reflected by the increased spread of CDS on Lehman´s debt. The protection on $10 million of Lehman´s debt cost at this time $310,000 (contrary to $241,000 and $165,000 for insurance on $10 million of Merrill Lynch´s and Goldman Sachs´s debt).[119] Therefore, investors began to concern about Lehman´s financial health, what led to higher cost of funding. Some of them became reluctant to further transact with Lehman and participate in the repo agreements; other required more favorable terms. Due to concerns about the real

[115] Wiggins, Piontek, Metrick (2014), p. 8.
[116] Lehman Brothers Holdings Inc. (2008), p. 83.
[117] FCIC (2011), p. 330.
[118] Valukas (2010), p. 732.
[119] FCIC (2011), p. 325f.

value of Lehman´s real-estate-related assets, many lenders refused these assets as collaterals.[120]

In June 2008, the Company reported its second-quarter results – a loss of $2.8 billion.[121] This had further negatively impacted the fragile market confidence. The lenders began to reduce their exposures to the firm or placed high demands, which led to severe financial difficulties as the funding was granted only by a small number of counterparties. Lehman was actively searching for a solution for this terrible situation. It was considering many options – investment by Korea Development Bank, the sale of its investment management business (Neuberger Berman) or acquisition by Bank of America or Barclay. But any of these options had been materialized. And additionally, US government announced that it would not provide assistance for the company.

The situation escalated on September 8, 2008, when Lehman published its third-quarter loss of $3.9 billion and $5.6 billion write-downs on residential mortgages and real-estate assets. Additional counterparties reduced their business with Lehman and JP Morgan, Lehman´s clearing bank, was demanding more and more cash collaterals to continue cooperating with Lehman. As a result, on September 15, 2008, Lehman was unable to continue its operation and filed for bankruptcy.

6.3.1 Did CDS play a role in Lehman Brothers´ failure?

FCIC concluded that the failure of Lehman Brothers was caused by “inadequate regulatory oversight, risky trading activities (including securitization and over-the-counter (OTC) derivatives dealing), enormous leverage, and reliance on short-term funding“. It follows that the Commission directly blamed OTC derivatives for their role in the bankruptcy of Lehman.

Before its bankruptcy, it was estimated that the gross notional amount of outstanding CDSs with Lehman as a reference entity was between $72 billion and $400 billion. The lower value of $72 billion comprises of contracts recorded by the DTCC and the upper amount of $400 billion anticipated by the Financial Times. Therefore, in the financial markets prevailed a high degree of uncertainty about the net exposure and

[120] Wiggins, Piontek, Metrick (2014), p. 8.
[121] Lehman Brothers Holding Inc. (2008), p. 4.

the effect that the bankruptcy of such a big player could have on the other financial institutions. In the auction process, it was determined the action price of $8.625 for Lehman´s debt; it means that CDS sellers had to pay 91.375 % of the debts´ face value.[122] For the gross notional value of $400 billion, it would correspond with a gigantic $366 billion that should be paid by protection sellers to protection buyers. Thus, the losses of firms on Lehman´s debt of $600 billion[123] would have been amplified by losses on CDSs by more than 50%. This had created a justified fear that the failure of Lehman could have created systemic issues.

The institutions that had sold a huge amount of protection on Lehman were suddenly forced to settle the contracts. But as shown later, the negative effect of these contracts was not so substantial as expected. Many participants were simultaneously buyers and sellers of the protection on Lehman´s debt. As reported, through DTCC was exchanged only $5.2 billion. For sure, this not includes all the settlements, but only that conducted through DTCC. Despite, there were noticed no serious problems or defaults of other institutions as the effect of Lehman´s bankruptcy.[124]

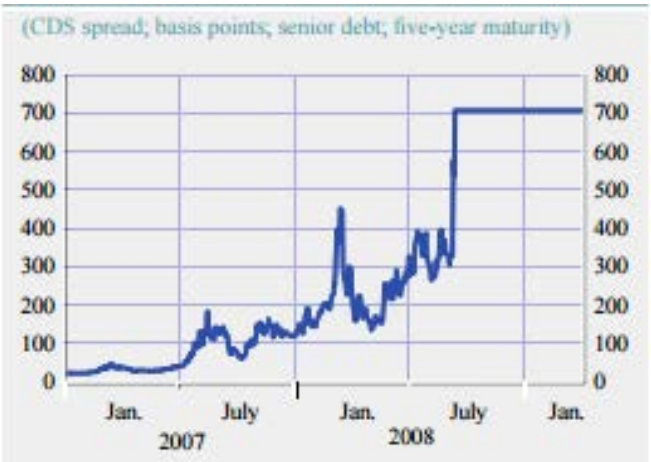
Moreover, there were also institutions that bought protection from Lehman. These were forced to find a replacement for their contracts. The incurred trade replacement costs were surprisingly much higher than the losses suffered by sellers of protection on Lehman. However, there was only one institution, namely Merrill Lynch, which reported in third quarter of 2008 a pre-tax loss of $2 billion caused by the unwinding of positions with Lehman and subsequently by purchasing of replacement contracts.[125] But the losses of Merrill Lynch as well as of other institutions were not large enough to push the companies into insolvency.

Thus, there is a question why many blamed CDSs for their role in Lehman´s failure and their contribution to the severity of the financial crisis? The first argument would be that “derivatives and especially credit default swaps made the credit crisis worse”[126]. Lehman had short before its bankruptcy ca. 1 million derivatives contracts with an infinite number of counterparties. Moreover, Lehman acted in a myriad of

[122] Stulz (2010), p. 80.
[123] Das (2010), p. 49.
[124] Stulz (2010), p. 80.
[125] ECB (2009), p. 33.
[126] Stulz (2010), p. 81.

other contracts as a reference subject. The uncertainty about the real net exposure and the identity of the counterparties of the CDS contracts escalated the panic in the market. It is very likely that Lehman would also bankrupt without CDSs, but the effect of bankruptcy would be probably not the same. CDSs sold by Lehman or referenced on Lehman created the channels for transmission of contagion from housing price declines and mortgage defaults from Lehman on the other financial institutions. The next argument is that the default can cause large jumps in the value of CDS contracts.[127] This was also verified by Lehman´s default. In March 2008, the protection on $10 million Lehman´s debt cost $310,000 for a year. Five months later, on the Lehman´s last working day, it cost $700,000, and finally, the auction process determined that protection sellers have to pay more than $9 million for the protection against $10 million Lehman´s debt. Therefore, the protection buyer could receive a high profit, but on the other hands, the protection seller could find himself in financial difficulties to settle the contracts. This could, therefore, lead to systemic risk, i.e. to the joint failure of many companies or the entire financial system.[128]

Figure 8: Materialization of jump-to-default risk during Lehman Brothers´ default



Source: ECB (2009), p. 66.

We can conclude that CDSs were not a primary cause of Lehman´s bankruptcy. Lehman defaulted rather because “market participants, rightly or wrongly at the time, believed that there was a high probability that the assets of these institutions were worth less than their liabilities”[129]. Lehman would have also defaulted without CDS

[127] Stulz (2010), p. 81f.
[128] ECB (2009), p. 66.
[129] Stulz (2010), p. 83.

contracts. But CDSs had a rather destabilizing effect on Lehman and the entire financial system. CDSs encouraged the firm´s aggressive growth strategy, and when Lehman defaulted, the uncertainty about the effect of Lehman´s bankruptcy increased the vulnerability of the entire financial system. In those days, no one knew how large were the net exposures referenced on Lehman and who were going to bear the risk.

7. Regulation of CDS market

In the previous chapters, we have discussed how CDSs have contributed to the increase of systemic risk during the recent financial crisis. We found out that though they were not the only and also not the central cause of the crisis, they have significantly weakened the stability of the financial system and exacerbated the financial crisis. Therefore, it became evident that the CDS market need to be appropriately regulated. The two key tasks of the regulators were to improve the transparency and reduce counterparty risk in the CDS market.

Table 7 provides the comparison of the three possible organization forms for CDSs. One of these, bilateral OTC trading, was already discussed in previous chapters and has appeared to be inefficient. Hence, we will now analyze the remaining two alternatives that could enhance the systemic stability of CDS market.

One possible option would be to move the CDS trading from OTC markets to organized exchanges. Exchanges would enable to remove some drawbacks of OTC markets, as they offer a high price transparency, effective competition and efficient measures to manage counterparty risk. But on the other hand, they would eliminate the offer of derivative contracts that exactly fits the needs of firms and investors, as well as limiting the development of new financial products that takes place over-the-counter.[130] Furthermore, the trading on exchanges would be only suitable for the most actively traded CDSs such as index CDSs, but not for less active derivatives.[131] Thereby, it proved to be inefficient to trade some types of CDSs on exchanges. And so, the regulators were obligated to find another solution.

[130] Duffie, Li, Lubke (2010), p. 9f.
[131] Squam Lake Working Group on Financial Regulation (2009), p. 5.

Consequently, the attention has been turned to the introduction of central clearing on the OTC markets. Central clearing has already appeared as highly beneficial in exchange trading, and therefore it should also have a potential to solve the problems of counterparty risk and transparency issues in OTC markets.

Finally in September 2009, after a lengthy discussion, the G20 leaders introduced the obligation to clear all suitable OTC derivatives through CCP. This agreement entered into force in the US through the adoption of Dodd-Frank Act and in Europe through European Market Infrastructure Regulation (EMIR).

CCP is a clearinghouse that performs all the activities that take place from the moment the parties have agreed to trade until the settlement of the contract. Hence, in case the trades are cleared through CCP, the contracts between the two trading parties are replaced by new contracts between CCP and each of the counterparties. Thus, the CCP acts as *"a buyer to every seller and a seller to every buyer of protection"*[132]*,* what reduces the complexity of exposures between the financial institutions (Figure 9).

There could be identified four fundamental advantages of CPPs: Firstly, CPPs reduce counterparty risk and interconnections between the financial institutions that could lead in the absence of CPP to a chain reaction as some systematically important institution defaults.[133] Second, CPPs enable multilateral netting of exposures. The result of this type of netting is a net exposure of each market participant to the CCP.[134] Third, CPPs improve the collateralization practice in CDS markets. To secure against the potential losses from a default of its members, CCP requires from each participant to pay an initial margin (either in cash or in the form of securities of high credit rating). Moreover, the positions of members are daily or even more frequently mark to market and the resulting variation margin should have to be paid.[135]

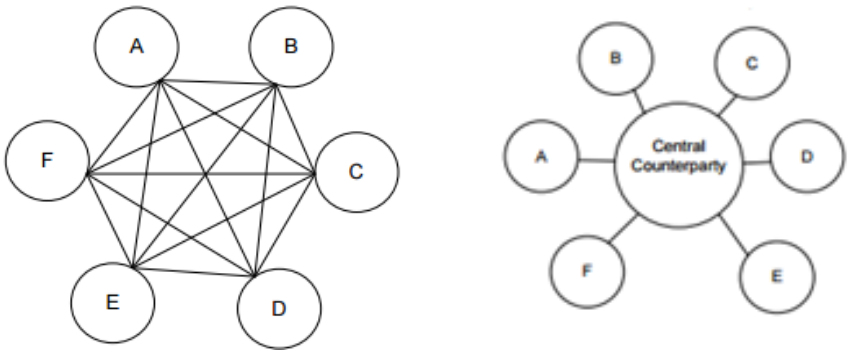
[132] The Board of the International Organization of Securities Commissions (2012), p. 25.
[133] Theis (2013), p. 78.
[134] Cecchetti, Gyntelberg, Hollanders (2009), p. 49.
[135] Cecchetti, Gyntelberg, Hollanders (2009), p. 50.

Table 7: Three possible forms of market organization for CDSs

Selected characteristic	Bilateral OTC	OTC with CCP	Exchange-based
Trading	Bilateral	Bilateral	Centralised
Clearing	Bilateral	Centralised	Centralised
Product features	All	Standardised and liquid	Standardised and liquid
Market maker importance	Significant	Significant	Limited
Collateral practices	Bilateral posting of collateral	Margin requirements uniform for all	Margin requirements uniform for all
Margin movement	Decentralised and disputable	Centralised enforcement by CCP	Centralised enforcement by CCP
Netting	Some gross exposures netted bilaterally and some ad hoc multilateral netting	Exposures are netted multilaterally and position is against a CCP	Exposures are netted multilaterally and position is against a CCP
Transparency of exposures and activity	Limited or none	Detailed information available but not disseminated	Detailed information available but not disseminated
Transparency of prices	Pre-trade prices are non-binding quotes Actual transaction prices typically not published	Pre-trade prices are non-binding quotes No automatic publication of transaction prices	Pre-trade prices are binding quotes Actual transaction prices published

Source: Based on Cecchetti, Gyntelberg, Hollanders (2009), p. 48.

Figure 9: No CCP Clearing vs. CCP Clearing



Source: Based on Duffie, Li, Lubke (2010), p. 6.

On the other hand, the introduction of CCP could also pose challenges to the stability of financial markets. The clearinghouse becomes itself a key node in the financial network, and therefore it could affect the stability of the financial system and become a channel of contagion. When one or more big members fail, the financial resources of CCP may not be sufficient, and it will fail to fulfill its obligations to other members.[136] For example, the disposal resources of the US biggest futures clearinghouse CME Clearing of $64 billion would not have been sufficient to manage the problems of AIG.[137]

Moreover, the CCP may increase the procyclicality of the financial markets and magnify the existing problems. This could occur in the case that the initial margins posted by the CCP´s members have to be adjusted due to aggravated market conditions, but members do not have enough financial resources. As a result, the margin requirements could so threaten the stability of CCP´s members.[138]

In summary, as it is not possible to trade all the CDSs on the exchange, the introduction of CCP on OTC market is a good solution to enhance the transparency and mitigate counterparty risk of CDSs. But it is also necessary to still remember that CCP is not a panacea[139]. The clearinghouse is a systematically important financial institution that has its own weakness and vulnerabilities. And therefore, it must be appropriately regulated to ensure that it works efficiently and actually decrease systemic risk in the financial system.

8. Conclusions

As was highlighted in this thesis, CDSs have many positive effects on the financial markets. But the insufficient regulation and adverse incentives have made from them dangerous tools that contributed to the systemic risk and exacerbated the recent financial crisis. It was caused by the fact that CDSs created between financial institutions a complex web of unknown CDS contracts which in time of financial distress create uncertainty and escalate panic.

[136] Rehlon, Nixon (2013), p. 6.
[137] Stulz (2010), p. 89.
[138] Rehlon, Nixon (2013), p. 6.
[139] Pirrong (2011), p. 6 and Stulz (2010), p. 89.

Although CDSs played a significant role in the near-failure of AIG, they were not the only cause of the company´s troubles. The CDS portfolio became so enormous and potentially dangerous as a result of the profound failure of the firm´s corporate governance and risk management practices. Therefore, the problem of AIG during the crisis was not its CDS portfolio as such, but the fact that CDS exposures were not hedged and the company did not hold sufficient capital reserves. Ex-post, it has shown that if AIG had been allowed to fail, the effect on its CDS counterparties would not have been as disastrous as was initially predicted. Goldman Sachs, AIG´s largest counterparty, confirmed that its losses would have been immaterial if AIG had failed. But this was not clear in times of crisis when nobody knew the exact exposures and the extent in which these exposures were hedged. Thus the case of AIG has confirmed the necessity to appropriately manage the counterparty risk and strengthen the transparency of CDS market.

The case study of Lehman Brothers has revealed that the CDSs were not the primary cause of the Lehman´s bankruptcy and the company would have also defaulted without CDSs. But despite, the CDSs increased the vulnerability of the entire financial system. Lehman acted in a myriad of CDS agreements as a reference subject, but nobody knew how large were the net exposures and who were the counterparties of these contracts. This uncertainty generated the panic in the financial system.

After the financial crisis, it became evident that to enhance the stability of the financial system, CDS market should be appropriately regulated. The two key tasks of the regulators were to improve the transparency and reduce counterparty risk in the CDS market. These issues were to a large extent solved by the introduction of CCPs. However, it is important to note that the CCP is not a panacea. If not appropriately regulated, it could amplify rather than reduce systemic risk.

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Zusammenfassung

Die Credit Default Swaps (CDS) gehören der Familie der Derivate an, welche es Finanzinstituten erlaubt, Kreditrisiken zu verwalten. Vor dem Ausbruch der Finanzkrise im 2008 wurden CDS außerbörslich gehandelt und unterlagen somit keiner regulatorischen Aufsicht sowie keiner genauen Protokollierung. Mehrheitlich waren die Akademiker der Auffassung, dass CDS die Stabilität des Finanzsystems erhöhen und somit einen positiven Effekt auf die Finanzmärkte haben.

Die Ansicht hat sich mit dem Scheitern einiger, großer Marktakteure – wie Lehman Brothers, Bear Stearns oder AIG – geändert. Derivate, insbesondere CDSs, werden vermehrt als Grund der Krisensituation angesehen. In diesem Zusammenhang ist das Ziel dieser Arbeit, die Frage zu beantworten, ob CDS zum systemischen Risiko der großen Finanzkrise beigetragen haben.

Um die Antwort auf diese Frage zu erhalten, wird zunächst bereits vorhandene, relevante Literatur aus diesem Forschungsgebiet einer kritischen Betrachtung unterzogen. Danach wird die tatsächliche Auswirkung der CDS auf AIG sowie Lehman Brother erforscht und im Zusammenhang mit dessen Kollaps bewertet.

Die Arbeit schliesst mit dem Ergebnis, dass die genannten CDS nicht die Hauptursache der Krise waren, aber einen schwächenden Effekt auf die Stabilität des Finanzsystems hatten und somit die Finanzkrise stark verschärft haben.