

The impact of increasing regulation on the derivatives market

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<p>This thesis examines the impact of the Group of Twenty regulatory reform program on the over the counter derivatives market. The Group of Twenty started a reform program in 2009 with the aim of building a more secure market for over the counter derivatives. The objective of this thesis is to show how the principles of the regulatory reform program were implemented into working regulation within the European Union.</p> <p>The thesis is made up of a theory section and an empirical section. The theory section consists of established finance literature. The main focus is on literature dealing with the structure of financial markets and on the theory of derivatives. A large part of the theory section is dedicated to the reasons and causes behind the recent financial crisis.</p> <p>The empirical section of the study is based on qualitative research methods. The empirical material is gathered from countless articles, surveys and letters.</p> <p>The thesis shows that the newly created derivatives regulation of the European Union is not fully in line with the principles outlined by the Group of Twenty. The research showed that the implementation of the regulation has not been a total success. The implementation has been plagued by rush, technical problems, political motivations and mistakes made in past legislation. Some fear that certain parts of the European Union regulation are threatening to undermine the original Group of Twenty commitment to bring safety and transparency to the derivatives market.</p> <p>However, this study was done at a time when the European regulation was not yet fully implemented. The regulatory work is an ongoing process and it is expected that the problems noticed in this thesis will be solved at a later time.</p>	
<p>Key words Over the counter derivative, European Union, systemic risk, derivatives reform</p>	

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1 Introduction

In today's globalized world, where new market opportunities arise and competition increases, companies need to develop abilities that enable them to quickly adapt to changing market conditions. One way to do so is to master the use of derivatives. Derivatives can be used speculatively to seek returns or more cautiously to seek protection from financial risks. The financial flexibility that derivatives provide was a contributing factor in the events leading to the financial crisis of 2007-2008.

The financial and economic crisis that began in 2007 showed great weakness in the capability of banks and other market participants to handle financial and economic distress. The crisis demonstrated that further transparency and regulation of over the counter derivatives and market participants was needed in order to limit excessive and complex risk taking. It is widely considered to be necessary to reduce systemic risk created by derivatives transactions, markets and practices. (Bank of International Settlements 2013b)

As a weapon to fight systemic risk, the Group of Twenty started a reform program in 2009 with the aim of building a more secure market for over the counter derivatives. The Group of Twenty is a group of finance ministers and central bank governors from 20 large economies. The reform program includes four elements.

- All standardized OTC derivatives should be traded on exchanges or electronic platforms, where appropriate.
- All standardized OTC derivatives should be cleared through central counterparties (CCPs).
- OTC derivative transactions should be reported to trade repositories.
- Non-centrally cleared derivative transactions should be subject to higher capital requirements.

(Bank of International Settlements 2013b)

Local financial authorities are responsible for implementing regulation that complies with above mentioned principles. In the United States this regulation is part of the

Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd – Frank). In Europe the regulation is written in European Market Infrastructure Regulation (EMIR).

In this thesis the author studies how the principles laid out by the Group of Twenty have been translated to actions by the European Union financial market regulators.

1.1 Research questions and scope

The research question of the thesis is: How has the derivatives regulation changed the derivatives marketplace in Europe after the financial crisis and credit crunch? The aim is to study both the actual changes in regulation and the actions the actors on the derivatives market have had to take to ensure compliance. The research aims to outline the underlying reasons for the financial crisis and the motivation from which the regulation was born.

The research is focusing on changes in the regulation within European Union. Although the European regulation has not been in place for long, it should already now be possible to study how the market has initially reacted to it. The thesis focuses on regulation that has a direct impact on operational issues and regulation governing capital requirement is out of scope. The regulation mandating that all standardized OTC derivatives should be traded on exchanges is still being prepared in European Union and is not expected to enter into force before late 2016 or early 2017. Therefore, it is not in scope for this thesis.

1.2 Thesis background and objectives

The author of the study has worked with derivatives at Nordea Bank Finland since January 2007. He has worked for the last five years in a derivatives business development unit. The development work has consisted of taking part in projects and development tasks mainly related to post trade operations. During this time, no other single event has had as much impact on the derivatives marketplace as the new regulation stemming from the financial crisis. It is worth mentioning that during the last year the new regulation has been part of the author's every working day. Working with deriva-

tives for a long time has given the author a good understanding on the magnitude of the changes that the regulation has brought and will bring in the future.

The original objective of the thesis was to perform a study of the new tasks and process needed in Nordea Bank Finland to comply with the new derivatives regulation. After working with the real life regulatory tasks, the author felt that studying things that he already knew was not interesting.

Therefore, objectives of the study is not to list the things that Nordea Bank Finland or any other financial institution had to do in order to be compliant with new regulation but to understand the reasons why the regulation was put in place in the first place. For the author it is much more important to understand the reasons and goals behind the regulation than to make a list of new processes that had to be implemented at Nordea Bank Finland in order comply with the regulation. For the author, understanding the regulation is paramount for being able to succeed at work. Therefore, this is not a study on Nordea Bank Finland but a study on the regulation itself.

The conclusions of the study can be used in internal regulatory documentation of Nordea Bank Finland but the study is not commissioned by Nordea Bank Finland.

1.3 The structure of the thesis

The first chapter of this thesis outlines the background and research question of the thesis. Second and third chapters explain how financial markets work. Fourth chapter introduces different types of financial risk types. The differences between exchange traded derivatives and over the counter derivatives are explained in chapter five. Sixth chapter explains the role securitization and systemic risk played in the credit crunch. Research methodology is explained in the seventh chapter. European derivatives regulation is explained in detail in the eighth chapter. Conclusions on the research can be found from the ninth chapter.

2 Financial intermediation

In order to understand the causes and effects of the recent financial crisis, it is important to understand how and why the financial markets work as they do.

At any given time it is possible to see two distinct types of economic agents within an economy: Those that have surplus funds due to their income being higher than their expenses and those that require more funds to finance their expenses which exceed their income. (Pilbeam 2010, 27)

The process of transferring money from economic agents with surplus funds to economic agents willing to utilize those excess funds is called financial intermediation. In order to understand financial intermediation it is necessary to understand that economic agents have very different financial positions, investment, business and financial needs. To cater for these needs there is a wide range of financial instruments and financial intermediaries. (Pilbeam 2010, 27)

Excess funds in an economy are transferred between different types of economic agents by a financial intermediary by means of the issuance of a financial security. Financial securities are an asset to one of the economic parties and a liability to the other. The financial intermediaries play a crucial role between the economic agents facilitating the transfer of funds. (Pilbeam 2010, 27)

Agents with surplus may be government agencies, individuals or companies which all have a variety of motives to save surplus funds. Companies save money to finance future investments and ordinary people save money in order to finance future purchases. Generally surplus agents want financial securities that offer them a good mixture of liquidity, return and protection against rising inflation. (Pilbeam 2010, 28)

Deficit agents can be individuals, companies or government agencies with varying reasons to borrow funds. Individuals often wish to borrow funds to finance expenditure that temporarily exceeds their income, like a car or a house. Companies wish to borrow funds to finance investments. And as investments take a long time to yield profits, they

aim to get long-term financing. There is a high level of uncertainty in the return on investments so companies aim to acquire financing as equity. Equity holders are compensated for their funds only if the investment of the company yields profit. (Pilbeam 2010, 28)

It is then clear that excess funds from surplus agents need to be transferred to deficit agents. This is done with financial securities. (Pilbeam 2010, 28)

2.1 Financial security

A financial security is a legal claim to receive a cash flow in the future. The terms financial instrument and financial security are interchangeable. Each financial instrument is issued by an economic agent (issuer) that agrees to make future cash flows to an investor that is the legal owner of the issued instrument. (Pilbeam 2010, 28)

It is possible to distinguish two types of financial instruments: debt and equity claims. The investor of a debt claim has a predetermined cash claim to receive back the invested amount and interest return on the invested amount. The interest rate on the claim may be fixed or floating. The investor of an equity claim only has rights to a cash payment when the investors of debt claims have been paid. Therefore, an equity investor has no guarantee that any return will be paid on the equity claim. The payments of an equity claim are called dividends. (Pilbeam 2010, 28)

It is important to understand the difference between debt and equity. The investors of debt instruments usually face a low risk compared to the investors of equity. Debt instrument investors are often banks and debt issuers are companies. The investing banks face a fairly low risk of a default as the loan contract is often secured against an asset owned by the issuing company. If the company fails to meet its legal obligations, it is possible for the investor to liquidate the asset and gain some of the invested amount back. In comparison, equity investors have much more risk as the incoming dividend cash flows and the future value of the equity are uncertain. Therefore, the return on the equity claim is difficult to predict as it is determined by the profitability of the issuing company. (Pilbeam 2010, 29)

The difference between debt and equity determines which kind of financing a company wishes to acquire for their investments. As it is inherently risky for a company to make investments, they tend to prefer acquiring financing with equity since dividends need to be paid out only if the investment yields profit. Issued debt needs to be paid out regardless of the success of the investment. On the other hand companies often acquire financing with debt instruments. This is done if a company finds that the risk of the investment failing is low or the price of debt financing is attractive. (Pilbeam 2010, 29)

2.2 Financial intermediaries

The marketplace where economic agents and financial intermediaries operate is called financial markets. Financial assets are being traded and exchanged to other financial assets, money, commodities or services. Financial intermediaries are tasked with circulating funds from surplus agents to deficit agents i.e. transferring funds from those that wish to save funds to those that wish to borrow funds. In doing so, financial intermediaries perform several economic functions. (Pilbeam 2010, 30)

2.2.1 Maturity transformation

Economic agents with surplus funds usually wish to have their invested funds available with a short notice. Deficit agents on the other hand wish to borrow funds with a much longer-term. A financial intermediary like a commercial bank accepts investor's funds on a short-term basis and transfers these liabilities into long term assets like loans. This process of converting liabilities to assets is called maturity transformation. The reason why commercial banks are able to perform this is because they are in business with a large volume of depositors and lenders. This enables financial institutions to predict their outflow and inflow of funds and lower their needed liquidity reserves. (Pilbeam 2010, 30-31)

This process is vital to the economy as it provides both types of agents a greater choice in how to borrow and save funds. There would be less exchange between surplus and deficit agents if the financial intermediaries did not exist. Since the short-term liquidity

needs of the surplus agents would fail to meet the long term financing requirements of deficit agents. The absence of financial intermediaries would force deficit agents to compensate the loss of liquidity to surplus agents by paying a higher rate of interest. The higher rate would induce the surplus agents to lend their funds for a longer period. (Pilbeam 2010, 31)

2.2.2 Risk transformation

Financial intermediaries play a role in balancing the willingness of economical agents to take risks. Agents looking for way to invest their excess funds usually have a high preference for safety in their investment. Surplus agents might require a full capital protection for their investment. More adventurous surplus holders can accept a certain level of risk assuming the prospective return on the investment exceeds the level of perceived risk. This is in stark contrast to the deficit agents who wish to borrow funds to finance their inherently risky investments. A surplus holder could in theory lend excess funds directly to a deficit agent but this arrangement would fully expose the surplus agent to the risk of the deficit holder defaulting on the loan. (Pilbeam 2010, 31)

Financial intermediaries play a role in transforming low risk requirements of savers into meeting the high risk needs of investors. A financial intermediary like a commercial bank can combine funds from many surplus agents to be lent to deficit agents. A commercial bank can limit the risks of lending money to deficit agents by making a large number of small loans compared to making a small number of large loans. In addition commercial banks loan funds to all sectors of the economy so they are not dependent on the success of individual companies or even sectors of economy. Financial intermediaries are also competent in analyzing and pricing the risk inherent in lending funds. (Pilbeam 2010, 31-32)

Financial intermediaries are obligated to maintain some ratio of capital to their asset portfolio. This ratio rises based on the risk level of the asset portfolio. Economic agents who have invested in financial intermediaries are protected by the capital base of the intermediary. This capital base provides a barrier for the investors' savings

should the activities the intermediary take incur significant losses. (Pilbeam 2010, 31-32)

2.2.3 Liquidity provision

One of the main tasks of financial intermediaries is to provide liquidity to the financial market. Surplus agents need a good ability to change their investments in financial assets into money at a fair price, low cost and with a short notice. Most savings products like bonds have a long term to maturity and in the case of equities no term to maturity. As surplus agents have a high need for liquidity they would not be willing to invest in these assets unless they have the possibility to change their investments to money at a short notice. (Pilbeam 2010, 32)

Financial intermediaries and markets work to bring potential sellers and buyers of an asset together. Functioning markets enable those that wish to sell an asset to obtain the best possible market price. In case of direct cash deposits to financial intermediaries, the surplus agents require an instant access to their deposited funds. As the financial intermediaries are good at predicting the incoming and outgoing deposit flows, they are able to provide liquidity without holding large cash balances in relation to their total deposits. (Pilbeam 2010, 32)

2.2.4 Reduction of costs

Financial intermediaries benefit from economies of scale. They are in business with countless surplus and deficit agents. The scale of their operation makes it possible to create standard products. By reducing the cost of search, contracting and information costs, financial intermediaries reduce the borrowing costs of deficit agents while simultaneously reducing the costs and risk of surplus agents. (Pilbeam 2010, 33)

3 Financial markets

There are many different types of financial markets that all cater for different needs. Money markets deal in short term assets that are easily transformed into cash. Securities markets enable the raising of new capital and the trading of bonds and existing

listed or non-listed shares. Foreign exchange markets act as a place where different currencies are traded for one another. Derivatives markets are where future obligations and options to buy and sell assets are traded (Pilbeam 2010, 33)

Markets can be divided to primary and secondary markets. On primary markets new securities are traded whilst secondary markets are used to trade existing securities. The main concern for primary markets is to raise new funds to issuers from borrowers. This is done in various ways like selling new shares, issuing state treasury bills, commercial bills and bonds. Secondary markets are the marketplaces for financial securities that have been issued earlier. This means that the issuer of the share receives no funds for the sale of the security on the secondary market. Trades done on the secondary markets are nevertheless important to the issuer of the share as they determine the value of the issuing company. Secondary markets are also important for investors as they provide them with the all-important liquidity and the possibility to sell or buy securities outside of the primary market. (Pilbeam 2010, 34)

3.1 Pricing of assets

The ability of an effectively working financial market to price assets on a continuous basis is one of its key purposes. The price of a financial security on the market is the level on which buyer and a seller are willing to execute a trade. If the amount of agents willing to buy an asset exceeds the amount of agents willing to sell the asset, the price of the asset rises. Consequently if the amount of willing sellers exceeds the buyers, the price of the asset falls. (Pilbeam 2010, 36)

“According to the efficient market hypothesis the market price of a financial asset will quickly move to reflect all available information. This means that buyers and sellers can be confident that the price they trade at is fair and reasonable.” (Pilbeam 2010, 36)

3.2 Discipline function

Financial markets help to ensure that companies and governments act with sound financial discipline. The existence of financial markets that trade on the debt and equity of companies and governments forces them to make financial decisions with the mar-

kets in mind. Companies need to consider the reaction that the markets will have on investments and other actions. If the markets feel that the actions taken by the company are financially unsound, the company will face either higher costs of acquiring financing from the market or decrease in the price of the share and in turn decrease in the value of the company. (Pilbeam 2010, 36)

3.3 Participants in financial markets

Modern financial markets are comprised of a variety of different types of participants. These include commercial and investment banks, financial institutions, investment companies, individuals, pension and insurance funds, multinationals, local and central government and international institutions. All these participants have different motivations for their actions on the financial market. (Pilbeam 2010, 37)

It is possible to separate market participants based on their motivation. The buying or selling of financial security in order to reduce or eliminate existing risk is called hedging. Arbitrageurs aim to make riskless guaranteed profit by exploiting price anomalies in the market place. Speculators are willing to take risks in order to make profit. Speculators open a position in a financial security hoping that changes in the price of the security result in positive revenue. (Pilbeam 2010, 37-38)

Financial market would not work as efficiently without brokers. They are intermediaries between investors. They act on the market on behalf of investor and charge a fee for their services. It is their task to bring hedgers, arbitrageurs and speculators together. (Pilbeam 2010, 38)

4 Financial Risk

Financial risk can be defined as the extent to which an organization or individual may incur losses as a result of an adverse movement in market rates or price in a certain financial security. As a broad statement one can say that investors require compensation for assuming risk. The riskier the investment the more return the investor requires to be compensated as a return for carrying the risk. The risk of an investment can be measured as the volatility of its returns to the investor over the volatility of the overall financial market. The objective of financial risk management is to reduce the volatility of the return on investment. (Cooper 2004, 1-2)

4.1 Financing risk

Financing risk is the risk that a company may no longer be able or afford acquiring financing from its chosen debt markets. High cost of financing decreases the amount that can be paid out to investors as dividends. The realization of financial risk may have devastating impacts on a company. If the risk materializes it means that the company may no longer pursue its chosen strategy. This is a consequence that is particularly true if the strategy of the company includes expansion through organic growth and investments. Re-financing of existing debt can also become impossible. (Cooper 2004, 3-4)

Financing risk may be realized from breaches of company's loan agreements as a result of inappropriate financial structures. Or the risk can materialize because of a failed financing strategy. A company might fail diversifying its sources of funding or the company might have a high proportion of its financing maturing at the same time. (Cooper 2004, 4)

4.2 Liquidity risk

Liquidity risk arises from a company's insufficient financial resources to cope with the day to day fluctuations in working capital and cash flows. This risk needs to be addressed even when the financing risk from long-term financing is under control. (Cooper 2004, 6)

Failing to control liquidity risk, results in a number of adverse effects. A company might have insufficient liquid funds to pay its liabilities when they are due. This result in penalty costs, loss of reputation and even bankruptcy. Failures to notice the need for liquidity might force the use of cash deposits and short-term borrowings at the same time. This result in expenses as the rate received on the deposit is lower than the rate paid on the short term financing. (Cooper 2004, 6)

4.3 Transaction risk

Transaction risk is caused by changes in foreign exchange markets. A company is exposed to transaction risk if it has future foreign currency receipts or payments. The changes in exchange rates, between the moment when the payment obligation has occurred and the actual payment, can have effect on the revenue of a company. Transaction risk is usually short term and is typically the result of a company being obligated to pay foreign currency to an overseas supplier. (Cooper 2004, 7)

4.4 Translation risk

Translation risk is a concern for companies with overseas subsidiaries. The domestic currency value of a subsidiary's assets and liabilities change when the foreign exchange rate between the domestic and overseas currency fluctuates. Also the revenue generated in the subsidiary fluctuates. These changes can have substantial effect on the financial result of the company. (Cooper 2004, 7)

4.5 Economic risk

A company can have exposure to foreign exchange market based economic risk even in currencies that they themselves do not have business in. A company exporting from the Eurozone to USA has transaction risk in EUR/USD exchange rate and economic risk between USD and other currencies. Changes in the rate between USD and other currencies can give competitive advantage to non-Eurozone companies. (Cooper 2004, 8)

4.6 Interest rate risk

All companies with borrowings or deposits are exposed to interest rate risk. The changes in interest rates change the cost of floating rate financing. In turn the rate changes also affect the return on cash deposits. (Cooper 2004, 8)

4.7 Credit Risk

Credit risk arises from the possibility that counterparties in derivatives contracts or borrowers default. (Hull 2012, 521) Credit risk and ways to protect from it are explained in chapter 5.3.

5 Derivatives market

Derivatives such as futures, forwards, swaps and options are used to transfer financial risk from one entity in the economy to another. (Hull 2012, 180)

A derivative is a financial instrument whose value is derived from the value of other underlying variables. Often the underlying variable is a price of some other financial instrument. Like in case of stock options, the value of the derivative is dependent on the value of the underlying stock. Derivatives can also derive their value from other sources than financial instruments. The value of the derivative can be taken from for example the price of freight shipments or the price of electricity. (Hull 2012, 1)

There are two types of derivatives markets: Exchange traded markets and over the counter markets. Exchange traded or so called listed derivatives are traded on multiple derivatives exchanges. Derivatives traded on exchanges are standardized contracts defined by the exchange. (Hull 2012, 2-3)

All derivatives trades are not done in an exchange. The largest trade volumes are in so called Over the Counter or OTC market. The OTC market allows the trade participants to negotiate a mutually attractive derivatives contract. Institutions are not forced to trade standard contracts like in an exchange. The downside of the OTC market is that the derivatives contract exposes the trade participants to credit risk. (Hull 2012, 2-3)

Both the exchange traded and OTC markets have been criticized after the start of the credit crisis in 2007. As an outcome of the crisis, the regulation of both markets has increased. Financial institutions have higher capital requirements to cover for the risk they are taking. Institutions are also forced to pay more attention to their liquidity situation. (Hull 2012, 1-2)

5.1 Motives for using derivatives

Hedgers use derivatives to protect themselves from future movements in market prices. The key aspect of hedging is to reduce risk. This reduction is achieved by entering in to derivatives contracts that enable the hedger to know the exact price of an asset in a set time in the future. There is no guarantee that hedging provides a positive financial outcome. It just eliminates uncertainties about future prices. (Hull 2012, 11)

Speculators aim to make profit on the market by opening a derivatives position. They either bet that the price of an asset goes up or they are betting that it goes down. (Hull 2012, 13)

Arbitrageurs try to gain riskless profit by simultaneously entering into multiple transactions in similar underlying instruments in multiple markets. Their income is generated by brief price differences between the markets. (Hull 2012, 15)

5.2 Futures contracts

Futures contract is a legally binding agreement between two parties to sell or buy an asset for a certain price at a certain time in the future. Futures contracts are exchange traded derivatives. In order to make it possible to trade futures the exchange has specified certain standardized features to the derivatives contract. As a trade is done in an exchange, the trade parties do not know each other. The derivatives exchange provides a mechanism that guarantees both parties that the contract will be honored. Hence futures contracts are free of credit risk. (Hull 2012, 7)

A seller of a futures contract has a short futures position and the buyer of the contract has a long futures position. The party that has the short position has agreed to physically deliver the underlying asset on a specified delivery month and delivery place to the holder of the long position. As a compensation for the physical asset, the short position holder receives the futures price from the long position holder. The long position holder receives the physical asset from the short position holder. The actual physical delivery rarely happens as futures positions are closed out before the delivery time is reached. Closing out means; buying or selling an opposite but identical futures contract

as the original contract. The revenue from the futures contracts is determined by the price difference between the original and close out contracts. (Hull 2012, 23-24)

The futures prices on the exchange are determined by the laws of supply and demand. If more market participants want to open a short position than a long position, the futures price goes down. If the reverse is true, the futures price goes up (Hull 2012, 7)

The derivatives exchange specifies the details of the futures contract so that market participants know exactly what they are trading on. These specifications include a detailed description of the asset. The details are at a very high level especially with commodities as there is big variance of different types of commodities. The exchange must specify how much of the asset is due to be delivered under one contract. The delivery place must be specified as the expenses of physical delivery, especially with commodities, can be significant. Delivery months and trading times must also be specified. (Hull 2012, 24-26)

5.2.1 Margining

If two market participants would get in touch with each other and agreed to trade an asset for a certain price in the future, there would be a risk that one of the parties would not honor the contract. In doing so the party failing to honor the agreement is defaulting. One of the key reasons for trading in an exchange is to make sure that contract defaults are avoided. This is done by market participants posting margin to the exchange. (Hull 2012, 27)

When an investor opens a futures position in an exchange they are obligated to deposit (post) a so called initial margin to a margin account with the broker who has executed their trade in the exchange. The broker in turn posts the margin to the derivatives exchange. The initial margin is determined based on the value of the futures contract at trade date. At the end of each banking day the amount on the margin account is adjusted to reflect the changes in the value of the futures contract. If the price of the futures contract has moved favorably to the investor, the broker adds the difference between previous trading day's closing price and today's closing price to the margin

account of the investor. The broker has received the positive margin from the exchange. Investors with an opposite position in the same contract lose money on their margin account as their broker posts their margin to the exchange. The valuation of the futures position and the following transfer of margin is called marking to market (Hull 2012, 810). It makes sure that the gains and losses of each investor are honored every day. (Hull 2012, 27-29)

The balance on the margin account changes based on the market price movements. The balance on the account can drop below the initial margin but if the margin amount drops below a set level called maintenance margin, the broker will issue a margin call to the investor requesting to post enough margin to reach the initial margin level. The extra funds are called variation margin. If the investor is unable to provide enough variation margin, the broker will close out the investor's futures position. (Hull 2012, 28)

5.2.2 Clearing houses

Clearing houses act as financial intermediaries in futures contracts. These clearing houses are operated by the derivatives exchanges. They guarantee the performance of contracts to parties of each futures contract. Clearing houses have members who post funds to the clearing house. Just like an individual investor needs to have a margin account with a broker, the broker needs to have a margin account with a clearing house member. Clearing house members need to in turn have a margin account in the clearing house. The task of the clearing house is to keep track of the contracts of each member so they can daily calculate the positions for each member. (Hull 2012, 30)

The whole purpose of the margining and clearing houses is to ensure that funds are immediately available to futures investors when they make a profit. (Hull 2012, 30)

5.3 Forwards

Forward contracts are traded in the over the counter derivatives market. It is an agreement to buy or sell an asset at a certain price at a certain time in the future. Forward contracts are traded directly between financial institutions or between a financial institution and one of its clients. One of the parties to a forward contract acquires a

long position and agrees to buy the underlying asset on a certain predefined price on a certain future date. The other party acquires a short position and agrees to sell the asset with the same terms. (Hull 2012, 5) The parties are free to agree on mutually agreeable terms for the forward trade. (Hull 2012, 3)

A major difference between futures and forwards contracts is the fact that the cash or physical settlement on the forward contract is settled at the end of the contract. In comparison futures trades have daily settlements on the investor's margin account. If an investor entered into two identical future and forward contracts, the profit or loss they experience is identical in amount but the futures cash flow is exchanged incrementally during the whole maturity of the trade whereas the payment on the forward contract is typically exchanged on the end date. (Hull 2012, 41-42) This means that forward contracts have credit risk as the value of the contract is not settled between parties daily. (Hull 2012, 41)

5.4 Options

Option contracts offer an inexpensive and flexible way to control economic risk or take on highly leveraged speculative financial exposure. Options enable risk to be transferred from one party that wishes to reduce its risk, to another party that is willing to take on the risk for a premium. Options are an attractive instrument especially for speculators as a small upfront premium payment can result in significant returns. (Pilbeam 2010, 359)

Options can be traded on both exchange and over the counter markets. There are two types of options. A call or cap option gives the buyer of the option the right to buy the underlying asset at a certain date for a certain price. A put or floor option gives the buyer of the option the right to sell the underlying asset at a certain date for a certain price. The price in the option contract is called the strike price and the date is called the expiry or maturity date. (Hull 2012, 7)

An option gives the buyer of an option, the right to do something but the buyer does not have to exercise this right. In comparison on forward and futures trades the trade

participants are obligated to perform certain actions. Entering into a forward or future contract is free but buying an option always requires an up-front premium payment. (Hull 2012, 194)

The time when the buyer is allowed to exercise their right to buy or sell the underlying asset is determined by the option style. Typical options are either European or American. The buyer of an American option can exercise the option on any date before or including the expiry date whereas the buyer of a European option can exercise the option only on the expiry date. The option style has a major consequence on the profit and loss potential of the option. (Hull 2012, 194)

A purchaser of a put or floor option is hoping that the price of the underlying asset goes down on the market. An investor might purchase a put option with a strike of EUR 70. If the price of the underlying asset falls below EUR 70, the investor can purchase a cheaper asset from the market and sell the same asset to the seller of the option for the agreed price of EUR 70. The profit for the buyer is the difference between the strike price and the market price deducted with the paid premium. The loss for the seller is the opposite of the profit for the buyer. The seller of the option gains the premium as profit if the market price on the expiry date is higher than the strike. (Hull 2012, 196).

If a buyer of a put option believes the price of the underlying asset goes down, in comparison the buyer of a call or cap option believes the price will go up. The call option gives the buyer the possibility to purchase the underlying asset from the seller at an agreed price. If the market price of the asset rises above the strike of the option, the buyer of the option gains the difference between the market price and the option strike deducted with the option premium. (Hull 2012, 195)

It is important to note that even when the option is in the money, i.e. the buyer is able to exercise the option; the option contract still might generate a net loss to the buyer. This happens when the price difference between the option and market price is smaller than the paid premium. (Hull 2012, 195)

5.5 Swaps

The first swap contracts were agreed upon in the early 1980s. Since then, their importance in the derivatives markets has grown significantly. A swap is an OTC agreement between two entities to exchange cash flows in the future. The swap agreement specifies the date when the cash flows should be paid and how they should be calculated. Typically the cash flow calculation is based on a future value of an interest rate, foreign exchange rate, stock - or commodity price. The swap contract usually has cash flow payments on multiple future dates. (Hull 2012, 148)

The reason for the existence of the swap market is that it enables companies to exploit arbitrage opportunities resulting from price differences in the credit market. There are a number of credit market imperfections that enable companies to obtain funding from the market at different rates of interest. (Pilbeam 2010, 408) Different companies are able to obtain floating and fixed rate funding from the market at different rates. A company having an absolute advantage on a floating market might want to swap floating rate funding to fixed rate funding with another company that has absolute advantage on the fixed rate market. (Pilbeam 2010, 398-399)

5.5.1 Plain Vanilla Interest Rate Swap or IRS

The most common type of swap is a plain vanilla interest rate swap or IRS. In an IRS a company agrees to pay a cash flow equal to interest at a predetermined fixed rate on a notional principal for a predetermined time. In return the company receives interest at a floating market rate on the same notional principal for the same time. (Hull 2012, 148)

Figure 1 illustrates a theoretical 3-year swap between two companies: Company A and Company B. Suppose that Company A agrees to pay Company B fixed interest rate of 5% per annum on a principal of 10 million EUR. In return Company B pays Company A six month Euribor rate on the same principal. Company A is called the fixed rate payer and company B is called the floating rate payer. (Hull 2012, 149)

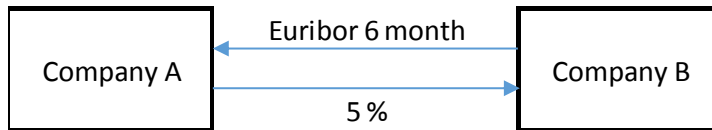


Figure 1. Interest rate swap

The first swap payment would take place six months after the effective date of the swap contract. Assuming that the day count fraction on the agreement is ACT/360 Company A would pay Company B $180/360 \cdot 5\% \cdot 1000000 = \text{EUR } 250\,000,00$ Company B would pay Company A interest on the 10 million principal at the 6 month Euribor rate prevailing 6 months prior to the payment date (rate fixing date). Assuming that the Euribor fixing rate was 4.2%, the floating rate payment would be $180/360/4.2\% \cdot 1000000 = \text{EUR } 210\,000.00$. In reality only the net difference between the payment amounts would be exchanged. In this case Company A would pay EUR 40 000.00. In total there would be six payments on the swap. The fixed payment amount would remain the same but the floating payment amount would change based on the changes in the interest rate. (Hull 2012, 149)

It begs the question: why would Company A want to enter into this kind of agreement? Figure 2 shows how Company A could use the swap to transform a floating rate loan into a fixed rate loan. Let us assume that Company A has borrowed 10 million EUR at six month Euribor plus 10 basis points. After they enter into a swap contract, they have in total three cash flows:

1. Company A pays 6 month Euribor plus 10 basis point to its lender
2. Company A receives 6 month Euribor from Company B
3. Company A pays 5% fixed rate to Company B

(Hull 2012, 151)

These three cash flows net out to a fixed interest payment of 5,1%. (Hull 2012, 149)

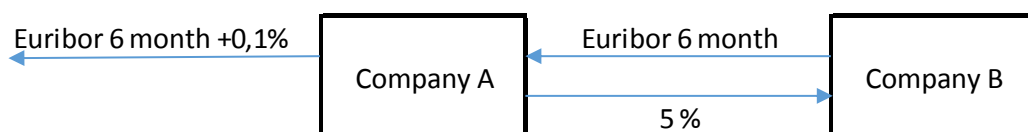


Figure 2. Using a swap to transform a liability

Company A could also use the swap to transform the nature of their asset. Figure 3 illustrates how Company A could change an asset earning fixed rate of interest into an asset earning a floating rate of interest. Let us assume the company has purchased 10 million EUR worth of bonds that will provide them with an interest of 4.7% per annum. After the company enters into the swap contract they will have following three cash flows:

1. Company A receives 4,7% on the bonds
2. Company A receives 6 month Euribor from Company B
3. Company A pays 5% to Company B

(Hull 2012, 152)

The cash flows net out to an interest rate inflow of Euribor minus 30 basis points. Company A has changed an asset earning 4,7% per annum to an asset earning Euribor minus 30 basis points. (Hull 2012, 152)

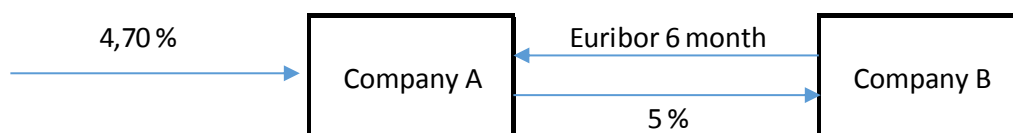


Figure 3. Using a swap to transform an Asset

5.5.2 Role of financial intermediaries in the swaps market

Previous examples of two companies entering into a swap agreement in real life is highly unlikely. Companies trade swaps with financial intermediaries such as banks or other financial institutions. The financial intermediaries earn their profit from the basis point difference in the swaps they sell and buy. Financial institutions enter into offsetting swaps with companies and assuming that all parties honor their obligations, the financial institution is guaranteed to make a profit. (Hull 2012, 152)

In real life the bought and sold swaps of a financial institution do not fully offset each other's. Financial institutions perform so called market making. They are prepared to

enter into swaps without having an offsetting swap with another party. Market makers quantify and hedge the risk these individual swaps are causing. They use for example forward rate agreements, bonds and interest rate futures to hedge these swaps. (Hull 2012, 153)

5.5.3 Cross currency swaps

Cross currency swap is an agreement to exchange principal and interest payments in one currency for principal and interest payments in another. (Hull 2012, 165) Cross currency swaps can be used to change the transform borrowings in one currency into borrowings in another. (Hull 2012, 166)

The principal amounts are exchanged between the parties at the start and end of the contract. The agreement requires the principal amount to be specified in both of the two currencies. The principal amounts are calculated using the foreign exchange rate at the swaps trade date. Therefore, the market value of the principal exchanges at the start of the contract should be roughly the same. At the time of the end principal exchange, the value of the principals can differ greatly as the FX rate has changed. (Hull 2012, 166)

5.6 Exchange-traded derivatives versus over the counter derivatives

A major advantage of exchange traded futures and options compared to similar OTC contracts is that the derivatives exchange guarantees every derivative contract. This relieves the counterparties to a contract of the burden of assessing the creditworthiness of the other party. Like explained before, exchanges impose considerable margin requirements on their members in order to protect themselves against the risk of defaults. Membership requirements are high and members' positions are constantly monitored by the exchange. Exchanges also have to maintain large clearing funds to meet unforeseen market situations. (Pilbeam 2010, 324)

International financial institutions have for years talked about the advantages and flexibility of the OTC forward and options market. Since the demand and motives of customers vary greatly, the exchange-traded derivative instruments are not always the best

answer to customer needs. To meet the customer demand, banks have created tailor made forwards and options. With these products banks are able to meet the customer's size, price and expiration date needs better than with standardized derivatives. Over the counter derivatives do have some drawbacks that exchange traded derivatives lack. The lack of standardization of OTC contracts means that there is a limited secondary market for OTC contracts. Therefore, the liquidity in the exchange traded product is better. Each party to an OTC contract bears the risk of default on the part of their counterparty. Creditworthiness of contract counterparts is not a concern in exchanges. (Pilbeam 2010, 324)

5.7 Effects of credit risk on OTC contracts

Credit risk has traditionally been a big part of OTC markets. It is always possible that a party on the other side of an OTC contract defaults. (Hull 2012, 30) Regulators have for years demanded that financial institutions hold on to enough capital to reflect the credit risk they are exposed to (Hull 2012, 521)

Calculating credit exposure of a bank is complicated. This is because, in case of a default, the claim arising from a derivative contract is more uncertain than in for example the case of a loan default. A bank with an outstanding derivative contract with a defaulting counterpart can find themselves in three different scenarios:

- The derivative is always a liability to the bank
- The derivative is always an asset to the bank
- The derivative can become either an asset or liability to the bank

(Hull 2012, 531-532)

An example of the first scenario is a sold option position, example of the second scenario is a bought option position and an example of the third scenario is a forward contract. (Hull 2012, 532)

Derivatives contracts from the first scenario have no credit risk to the bank if the counterparty defaults. Derivatives in the second scenario always have credit risk and a loss is most likely to be experienced by the bank. Derivatives in the third scenario may

or may not have credit risk. This is determined by the value of the derivative at the time of the default. If the value is positive for the bank at the time of the default a loss is likely to occur. If the value is negative to the bank at the time of the default no loss is occurred. (Hull 2012, 532)

As a safeguard to credit risk and defaults, the banks working in the over the counter market have started to adopt some of the procedures from the exchange traded derivatives market. (Hull 2012, 30)

5.7.1 Netting

A confirmation is a legal documentation for an OTC derivative contract. The drafting of derivative confirmations is being facilitated by International Swaps and Derivatives Association ISDA. ISDA has grafted a number of ISDA Master Agreements that define the terms and clauses used in individual derivative confirmations. The definitions from the ISDA Master Agreement are agreed upon by counterparties and signed. The definitions from the signed ISDA Master Agreement cover all derivative contracts between the parties (Hull 2012, 155)

One clause that has become a standard in ISDA Master Agreements is concerning netting. The clause states that, if a company defaults on one derivative contract with their counterpart, it must default on all outstanding derivative contract with the same counterpart. Using the netting clause can significantly reduce the credit risk of a financial institution. (Hull 2012, 534)

Trade counterparty might have multiple outstanding derivative contracts that some have negative and some positive market value. The benefits of netting are that the market values of all outstanding derivatives are netted together and the net market value for the whole portfolio is the occurred loss. If only the derivatives with negative value would be defaulted, the losses would be higher as they are not being decreased by the positive values. (Hull 2012, 534)

5.7.2 Collateralization

The use of collateral as protection from credit risk has been used in the OTC market for some time and is a similar process as posting margin in the futures market. Collateral can be used when two parties enter into an OTC derivative contract. The parties agree to daily calculate the market value of the contract. The party to which the contract value is decreasing is obligated to pay the value decrease to their counterparty. This daily payment is called variation margin. Variation margin payments are not settlements on the derivative contract but a security deposit intended to ensure that future obligations arising from the derivative contract will be honored. The party collecting the collateral has to pay interest on the received amount. (Hull 2012, 31)

There is usually a set threshold before collateral payments are required. Counterparties can agree to transfer collateral only when the value of the contract (or multiple contracts) exceeds a threshold amount. When the threshold is exceeded, the party entitled to collect collateral sends their counterparty a collateral call. The collateral call amount is the difference between the threshold amount and the value of the contract. The threshold amount can be considered to be a line of credit the counterparties agree to grant each other. (Hull 2012, 536)

In the event of a default of the party that has paid collateral, the collecting party, is entitled to seize the collateral. Using collateral does not eliminate credit risk completely. The collecting party is not fully protected from losses, as the collateral is only paid for the amount exceeding the threshold amount. This is the case even when the threshold amount is set to zero. Counterparties rarely decide to seize the paid collateral after the first failure to meet a collateral call. A failing counterparty can ignore collateral calls for some time before the collateral is seized. During this time the value of the derivative contract can move further in the collectors favor and the financial loss of the default rises. (Hull 2012, 536)

5.7.3 Downgrade triggers

One way to reduce credit risk is the using of so called downgrade triggers. Financial institutions can include clauses in derivative agreements that enable them to close out

their counterparts derivative contracts at market value if the counterpart's credit rating falls below a certain level. (Hull 2012, 536)

5.8 Credit derivatives

Credit derivatives are contracts whose value depends on creditworthiness of one or more companies or countries. They allow companies to trade credit risk in much the same way as other derivatives are used to trade market risk. Before credit derivatives, market participants used to be in a position where they could do little once they had assumed credit risk expect wait and hope the source of the risk does not default. With credit derivatives, companies can hold the credit risk they want and seek protection against the risk they do not wish to be exposed to. So far banks have been the biggest buyers of credit protection and insurance companies have been the biggest sellers. (Hull 2012, 547)

Traditionally banks have been in the business of originating loans and then bearing the credit risk that the borrower defaults. Banks are not keen on keeping these loans on their balance sheets. This is due to the fact that, after the capital required by the regulators has been accounted for, the return earned on loans is smaller than returns on other assets. Therefore, banks have started creating asset backed securities of originated loans, in practice passing loans and their credit risk on to investors. Banks have also extensively used credit derivatives to shift credit risk in their loans to other parts of the financial world. Insurance companies have traditionally been the entities selling the credit risk protection to banks. Insurance companies have not been regulated as heavily as banks so they have been willing to bear credit risk in return for income. The end result was that the financial institution bearing the credit risk was not the entity that originally did the credit checks for the loan. The end result of this separation is explained in chapter 6. (Hull 2012, 548)

5.8.1 Credit Default Swaps

Credit derivatives are divided to single-name and multi-name instruments. Most popular single-name derivative is the credit default swap CDS. The payoff from the contract is tied to the creditworthiness of one company or country. There are two sides to a

CDS contract: the buyer and seller of protection. There is a payoff from the seller to the buyer of the protection if the specified company or country defaults on its' issued bond obligations. (Hull 2012, 547) In return the seller of the CDS receives periodic payments from the buyer until the trade matures or the specified company or country, also called reference entity, defaults. (Hull 2012, 548)

The default is called credit event. Credit event is described to be a failure to make a payment as it becomes due, a restructuring of existing debt or bankruptcy. (Hull 2012, 549) If the reference entity defaults the seller of the CDS is obligated to buy bonds issued by the reference entity from the buyer of the protection at their face value. Typically the bonds don not change hands but the value of the bonds is exchanges as a cash settlement between the parties. (Hull 2012, 548-549)

5.8.2 Collateralized debt obligations

The most common multi-name credit derivative is called collateralized debt obligation CDO. When creating a CDO, a portfolio of debt instruments, like bonds, is chosen and a complex structure is created where the cash flows from the portfolio is divided to different categories for investors. (Hull 2012, 547) The mechanics of creating a CDO from mortgage loans is outlined in chapter 6.1 Securitization.

6 Systemic risk and dangers of derivatives

Derivatives are extremely flexible financial instruments. As mentioned earlier they can be used for hedging, speculating or arbitrage. The same flexibility that makes them suitable for multiple purposes can also cause problems. Occasionally traders with a risk mandate to hedge or use arbitrage end up opening speculative positions. Hence it is important for market participants to set up controls which ensure that derivatives contracts are used for their intended purpose. It is also vital to set trading limits and ensure that these limits are enforced. (Hull 2012, 16)

Derivatives can cause big problems, even when trading activities are performed according to rules and risk is being monitored. Sometimes trading activities are more risky than the market participants understand. This was the situation leading to the credit crisis in 2007. Derivatives contracts linked with American mortgage loans that traders in the market entered into were much riskier than the financial institutions understood. The expectation on the market was that housing prices in the U.S. would keep rising or at worst level off. Many multi-name credit derivatives contracts were structured with increasing prices in mind. Hardly anyone on the market was prepared for the steep decline in housing prices. (Hull 2012, 16)

6.1 Securitization

Taking deposits from the public has traditionally been the key source of funding for banks. During the 1960s, banks in United States realized that they no longer could fund the increasing mortgage loan lending with incoming deposits. This realization led to the birth of mortgage backed security market (MBS). Portfolios of residential mortgage loans were created and interest and principal payments generated from these loan portfolios were packaged as securities. This act is called securitization. These securities were sold to investors and the revenue was used for funding new mortgage loans. The United States Government created the Government National Mortgage Association or GNMA. GNMA was tasked with guaranteeing the cash flows from qualifying mortgages and created the actual securities that were sold to investors. (Hull 2012, 180)

As a result, the banks that originated the mortgages no longer kept the mortgages on their balance sheet. Securitization allowed the banks to increase their lending faster than their deposits were growing. The government guarantee from GNMA protected investors against defaults of mortgage loan borrowers. As time passed, securitization was being applied to other asset classes such as credit card loans. As the market developed, investors no longer required guarantee from the government against defaults by borrowers. (Hull 2012, 180-181)

The securitization arrangement can be explained by looking into how an asset backed security or ABS works. A portfolio of revenue generating assets such as mortgage loans is sold by the originating bank to a special purpose vehicle (SPV). (Hull 2012, 181) A Special Purpose Vehicle is a special purpose legal entity that is set up for a specific limited purpose by a sponsoring company. In securitization the SPV is usually a trust that is separated from the sponsoring bank so that a bankruptcy of the bank has no effect on the SPV or vice versa. By setting up an SPV the bank can protect itself from losses incurred from the mortgage loans. (Pilbeam 2010, 416)

The SPV allocates the bought assets to tranches (Hull 2012, 181). Tranches are related securities that are issued at the same time but have different risk and reward characteristics (Pilbeam 2010, 505). These tranches can be divided to three levels based on their characteristics. The tranches are: senior tranche, mezzanine tranche and equity tranche. The senior tranche has the highest principal and is promised the lowest income. The equity tranche has the lowest principal and is promised the highest income. The mezzanine tranche is between them. The risk in equity tranche reflects the higher return. (Hull 2012, 181)

The payout on the ABS follows a so called waterfall model. The income from the underlying portfolio of loans is divided to principal and interest cash flows. Principal cash flows are allocated to the senior tranche until its principal has been repaid to investors. Then principal payments are allocated to the mezzanine tranche until its principal is repaid. Equity principal is repaid only when the mezzanine has been repaid. Same applies for the interest payments. The outstanding interest is first paid to senior tranche. Assuming that this can be paid, interest payments are then allocated to the mezzanine

tranche. Only when mezzanine tranche has been paid, will the equity tranche receive interest on its principal. The extent to which the tranches receive their principal back depends on the losses on the underlying assets. The difference in the riskiness of the tranche is reflected in its credit rating. Before the crisis, the senior tranche was typically rated as AAA, mezzanine tranche as BBB and the equity tranche was left unrated.

(Hull 2012, 182)

Credit rating is a way of describing the creditworthiness of a corporate bond. Credit ratings are provided by rating agencies such as Moodys, S&P and Fitch. A bond with the highest possible rating has virtually no change of defaulting. (Hull 2012, 521)

Finding investors to buy the senior high rated tranches was usually not a problem as the tranches promised returns that exceeded the return of AAA-rated bonds. Equity tranches were usually bought back by the originator of the mortgage loans or sold to a hedge fund. Mezzanine tranches were a harder sell. Therefore, these mezzanine tranches were packaged with other mezzanine tranches to create Mezz ABS CDOs. The principal from these structures was then allocated to senior, mezzanine and equity tranches. The credit rating for the resulting tranches was such that the senior tranche has AAA rating although it was constructed of assets that originally had BBB rating. (Hull 2012, 183)

6.2 The United States housing market

The years between 2000 and 2005 was characterized in the U.S. by a great increase in so called subprime mortgage lending. Subprime mortgages are loans that are considered to be much riskier than normal loans. The relaxation of lending standards and the increase in subprime loans made house purchase possible for families that previously were considered ineligible to qualify for a mortgage. These individuals increased the demand for real estate and the housing prices rose. The situation of increased lending and higher house prices was attractive for mortgage lenders. Increased lending meant bigger profits. The hike in house prices also meant that the lending was covered by the underlying collateral (the house). If the borrower failed to pay the mortgage, the result-

ing foreclosure would not lead to a loss as the house value exceeded the mortgage amount. (Hull 2012, 185)

Mortgage lenders saw this as an opportunity to keep increasing their profits but the rising house prices presented a problem. First time house buyers were no longer able to afford to buy a house. In order to attract new house buyers, the mortgage lenders relaxed their lending standards. The amount of given loan as a percentage on the house value rose. Adjustable rate mortgages with a small teaser interest rate in the beginning followed by a significantly higher rate for the rest of the loan maturity was developed. People who could not normally afford to buy a house now had the opportunity to do so. (Hull 2012, 185)

These subprime mortgages were securitized like explained previously. The resulting securities usually had no guarantees that interest or even principal would be paid. The act of securitization played a part in the way that mortgages were originated. The lender had no incentive to consider the riskiness of the issued mortgage as they knew that it would be securitized and thus the risk would be for someone else to carry. The U.S. government also played a part in the problem via their actions that aimed in expanding home ownership. (Hull 2012, 186)

A typical characteristic on U.S. mortgage loans is that the mortgages are nonrecourse. This means that in case of a default, the lender is allowed to take control of the house but other assets of the borrower are off limits to the lender. This basically means that the borrower can at any time force the lender to buy the house for the principal outstanding on the mortgage loan. This characteristic encouraged speculative activity in the market and was a part cause of the house price bubble. (Hull 2012, 186)

6.3 The bubble bursts

No price bubbles can last forever. The house price bubble burst in early August 2007 was one of the most catastrophic bubble bursts in history. In 2007 many mortgage holders realized they no longer could afford to pay their mortgage. One key reason was the teaser rates from the adjustable rate mortgages ended and the rates hiked. Defaults

by borrowers led to foreclosures and the supply of houses on the market rose. This in turn led to decline in house prices. Some mortgage holders that had borrowed 100% or near 100% of the house cost ended up in a situation where the mortgage amount exceeded the value of their house and they in effect had negative equity. The lenders with negative equity could then exchange the house for the outstanding principal on the mortgage. The lender would then have to sell the house and push the prices even further down. (Hull 2012, 187)

As foreclosures increased, the losses incurred by mortgage loan originators also increased. One could assume that a 35% reduction in house prices would lead to at max 35% loss on the principal on the defaulting mortgages. This was unfortunately not the case. Many of the foreclosed houses were in poor condition and sold for a fraction of their value prior to the credit crisis. (Hull 2012, 187)

Investors in asset backed securities that were formed of mortgage loans incurred major losses. Many of the ABS tranches were efficiently worthless by mid-2009. Financial institutions like UBS, Merrill Lynch and Citigroup had big positions in some of the now worthless tranches. This caused them huge losses. The losses forced some major restructuring of the financial giants and Lehman Brothers was even allowed to go bankrupt. (Hull 2012, 187)

The losses that brought Lehman Brothers down were mainly due to its massive exposure to subprime mortgages through its ABS holdings. The reason why Lehman had accumulated such a large exposure to subprime loans is not quite known. Either it had to hold the high risk ABS equity tranches because it could find a buyer for them or they held on to them willingly. Controllers in Lehman Brothers had warned the bank's management of the risks inherent in their subprime exposure but management chose to ignore these warnings. (Pilbeam 2010. 430-431)

The collapse of Lehman Brothers created great uncertainty in the financial market because it was a counterparty to tens of thousands of derivatives contracts around the globe. Hedge funds and financial institutions for whom Lehman acted as broker or prime finance provider found their accounts frozen and faced problems executing

trades. The Dow Jones index fell drastically, interbank interest rates rose significantly and there was a rush to withdraw funds from money markets around the world. (Pilbeam 2010. 430)

The troubles experienced by the financial companies from the securities backed by residential mortgages led to severe credit crisis. The capital of banks had eroded by their losses. In 2008 the banks were increasingly risk averse and were reluctant to lend. Credit spreads, the excess of interest rate on a loan over risk free interest rate, had increased significantly and even creditworthy individuals and corporations found borrowing difficult. Spreads on the funding that banks offer each other's also soared indicating the reluctance to lend. (Hull 2012, 188)

6.4 Credit crunch

The sudden and very significant tightening of lending conditions which happened independently of official interest rates is called Credit Crunch. The market saw a significant decrease in lending on the interbank market and between banks and their customers. Market participants increased their risk aversion and moved from risky high price assets like equities and corporate bonds to less risky government bonds. (Pilbeam 2010, 427)

As the financial world paralyzed, many banks found it near impossible to raise funds by issuing short term commercial papers, to borrow from other banks on the interbank markets or even to find buyers for some of their assets. The lack of liquidity in the market was increased by phenomenon called liquidity hoarding. Some financial institutions chose to hoard whatever liquidity they had to make sure they could see themselves through the credit crisis. Central banks had to step in and buy much of the securities that financial institutions tried to sell. In this situation the central banks were in a way fulfilling their duty of being the lender of last resort. Central banks also increased the maturity of their lending and widened the range of assets they were prepared to accept as collateral for the provided liquidity. (Pilbeam 2010, 441)

One lesson learnt from the liquidity crisis was that prior to the crisis there had been too much focus on the capital adequacy of banks and not enough focus on liquidity issues. Once the crisis began, the disappearing liquidity of many financial instruments turned them practically untradeable. For example the secondary market for Collateralized debt obligations practically dried up during the crunch. The lack of liquidity on the CDO market made it impossible to establish price for the existing CDOs that the banks had on their trading books. This created uncertainty over the viability and share prices of banks. Many financial institutions, dependent on the interbank market for their liquidity, struggled to finance their operations. Many financial institutions that had a healthy balance sheet and met capital adequacy regulations were unable to function due to lack of liquidity. (Pilbeam 2010, 452)

Central banks also took action to lower short term interest rates. For example in the U.S. the Federal Reserve lowered their Federal Funds rate from 5.25 per cent in June 2007 to a target rate of 0-0.25 per cent in December 2008. The interest rate cuts had three roles. They reduced the interest payments of heavily indebted consumers and companies. This had a major effect in helping consumers with floating rate mortgage loans to continue servicing their mortgage payments. The decrease in short-term rates helped increase profit margins of banks which are positively influenced by the spread between short-term and long-term rates of interest. Decreasing rates stimulated consumer expenditure and economic activity. (Pilbeam 2010, 440)

The traditional way for central banks to intervene in the markets is through open market operations that influence short-term interest rates. These operations brought the short term rates to record low levels. During the crisis, central banks became increasingly concerned by the relatively elevated levels of long-term interest rates. Therefore, central banks engaged in a new practice called quantitative easing. Central banks purchased existing government and corporate backed bonds with the hope of raising their prices. The funds to purchase these securities were obtained by creating new money in central banks. The aim was to slow the speed of deflation that was occurring in the economy as a result of the crisis. Quantitative easing also pumped cash to banks in hope that it would encourage them to increase their lending to consumers and companies. (Pilbeam 2010, 442-443)

6.5 What went wrong?

Multiple factors contributed to the crisis that started in 2007. The lending standards that mortgage originators used were too relaxed. Complex products were developed to enable mortgage originators to move credit risk to investors and make money while doing it. Rating agencies that were tasked with analyzing the riskiness of the ABS tranches were not used to rating such complex products. The products were new and there was little or no historical data to base analysis on. Their normal business of rating bonds did not prepare them enough for rating asset backed securities. The products that were sold to investors were complex and often investors and rating agencies were provided insufficient and inaccurate information about the quality of the underlying assets. Investors on these complex products were blinded in the bull market (boom) and thought they had come up with a money making machine. They chose to blindly trust rating agencies and failed to perform their own risk analysis on the products. The blinding factor was that ABS that were rated AAA produced significantly more return than bonds with the same low risk AAA rating. (Hull 2012, 188-189)

Investors had the tendency to assume that an ABS tranche with a particular rating could be directly compared to a bond with the same rating. The rating agencies failed to take into account so called default correlation. Default correlation measures the tendency of different borrowers to default on their loan at the same time. Default correlation on mortgage loans is rather low during good times. If one borrower defaults it is often due to a reason that does not affect other borrowers. Individual defaults do not have negative effect on AAA rated tranches. During troubled times, like in 2007, the tendency for borrowers to default rises significantly and the reasons for the defaults are the same. As the default correlation increases also the losses on the asset backed securities rise. (Hull 2012, 188-189)

One reason the rating agencies failed to rate asset backed securities lies in the pricing model used for credit derivatives. The pricing of asset backed securities was mostly based on David Li's Gaussian copula pricing model which based the price of an ABS in the price of a related credit default swap. The pricing model worked by modeling

default correlations without using historical data but instead by using the prices of credit default swaps. The development of Li's pricing model led to rapid increase in the credit derivatives markets. The pricing model was created and used during a time of rapidly rising house prices. The rising prices led to very low default rates and also low correlation between defaults. When housing prices started falling and default correlations started rising, then the ABS yields predicted by the pricing model were too low and CDS contracts seriously underpriced. Risk free AAA rated ABS tranches were in fact full of risk the pricing model could not foresee. (Pilbeam 2010, 435-436)

A contributing factor to the size of the losses in the financial industry was the increased use of leverage, defined as the ratio of total debt to shareholder capital. The problem of increased leverage is that, although during good times it increases returns but it also increases risk and losses during periods of negative returns. (Pilbeam 2010, 434)

A major contributing factor to the crisis was the changes in the bank regulatory landscape in the late eighties and nineties. Banks around the world are regulated by the Basel Committee on Banking Supervision. The Basel accord of 1988 allowed banks to hold less capital for loans made for mortgages than for other consumer loans. Mortgage loans were considered to be relatively safe for banks. This increased the incentive for banks to increase their mortgage loan exposure. The Glass-Steagall act of 1933 had separated the United States banking system to two different sectors: The commercial banking sector and investment banking sector. The act was repealed in 1999 after heavy lobbying from the financial industry arguing that the separation was not needed and it hampered the competitiveness of the U.S. banking system. The repealing of the act allowed commercial banks to get involved in the issuance of CDOs, ABSs and in establishing special purpose vehicles. Some argue that the risk taking mentality of the investment banks started to permeate to the commercial banks. These regulatory changes played a major part in the severity of the crisis. (Pilbeam 2010, 431)

One result of the credit crunch is the increased amount of legislation and regulation. The Basel Committee on Banking Supervision working under The Bank of International Settlements creates global standards that are applied by bank supervisors in

countries around the world. Before the credit crisis, the Basel committee had released two sets of standards: Basel I and Basel II. These were mainly regulating the amount of capital banks are required to have in relation to their risk. (Hull 2012, 188-189)

Although the new capital requirements for banks are out of scope in this thesis it is still good to understand the basics of the Basel accords. Under the Basel capital adequacy guidelines, bank capital is separated into two tiers. Tier 1 capital or core capital consists of stock equity, certain preferred stock, net reserves and minority interests in consolidated subsidiaries. Tier 2 capital or supplementary capital consists of certain preferred stock, hybrid capital instruments, equity contract notes, loan-loss reserves, perpetual debt and subordinated debt. The riskiness of the capital is based on a five-step credit risk weighting. The riskier the asset is, the more weight it gets when calculating risk-adjusted capital amount. For example, government treasury bills and cash contain no risk, but loans to companies are considerably riskier. The amount of needed Tier 1 and Tier 2 capital is calculated from the risk-adjusted capital amount and not from the real value of the assets in the capital. (Pilbeam 2010, 474)

Too harsh capital requirements for banks could harm the economy during a recession. That is why some experts suggest a countercyclical capital regulation that would raise capital requirements during economic expansion to limit credit growth and in turn lower requirements during recession to encourage lending. (Pilbeam 2010, 478)

Basel III was born of the credit crisis. The new regulation increases the amount and quality of capital requirements. It also requires financial institutions to meet standards on liquidity requirements. During the crisis, banks found it difficult to find cheap short-term funding, so the new regulation tries to ensure that banks in the future don't see their short-term funding drying up. On top of the Basel III regulation, local governments have created their own pieces of regulation. (Hull 2012, 188-189)

6.6 Systemic risk

Systemic risk is the risk that a default by one financial institution will cause a chain reaction that leads to defaults by other institutions and dangers the stability of the whole

financial system. One major bank failing might cause other banks to struggle honoring their over the counter derivative contracts which in turn leads to more banks failing. During the financial crisis, global governments did not want to allow this to happen so instead of allowing large banks to fail, they bailed out many of the defaulting banks. The reason for this was that officials did not want the systemic risk to tumble the whole financial system. Financial authorities see that regulation must prevent this from happening again. (Hull 2012, 33)

Regulators felt that credit default swaps were a source for systemic risk and danger to the financial markets. The danger with credit derivatives is that a default of one financial institution might lead to major losses for its credit default swap counterparts. The fear was fueled by the troubles of the insurance giant American International Group Inc. AIG. AIG was one of the biggest sellers of credit protection for the AAA rated tranches created from Mortgage loans. The sold credit protection proved to be extremely expensive for AIG, as mortgage loan holders defaulted, and it had to be bailed out by the U.S. Government. (Hull 2012, 550)

Regardless of the bailouts, the credit default swap market survived the market turmoil of 2007 reasonably well. The market has come under increased regulatory pressure but the importance of credit default swaps will not likely decline. They are still an important way for companies to manage credit risk. (Hull 2012, 555)

It is interesting to note that the term systemic risk has not yet been fully agreed upon by the financial world. Like the 2013 Nobel Prize winner Lars Peter Hansen (2013, 4) states, there are multiple notions for systemic risk. Some consider systemic risk to be a modern equivalent to a bank run where liquidity is escaping from banks. Others see it as a description of vulnerability of a financial network in which unwanted consequences of internal shock can spread and grow within the financial network. Maybe the most common version of systemic risk is the one where the insolvency of a major financial actor disrupts the financial network. In his opinion the term systemic risk is therefore:

“a grab bag of scenarios that are supposed to rationalize intervention in financial markets. These interventions come under the heading of macroprudential policies.” (Hansen 2013, 5)

As past recessions have been triggered by financial crisis, it comes as no surprise that there was legislative pressure for external monitoring, intervention and regulation of financial markets to reduce systemic risk. (Hansen 2013, 5)

The losses on products created from residential mortgages should not be viewed as an indictment on the whole derivatives industry. The derivatives markets is a huge multi-trillion dollar market that by most standards has been incredibly successful and has served the needs of its user well (Hull 2012, 779)

To quote Alan Greenspan (2005) from the United States Federal Reserve:

“The use of a growing array of derivatives and the related application of more-sophisticated approaches to measuring and managing risk are key factors underpinning the greater resilience of our largest financial institutions”

7 Research methodology

The research method chosen for this thesis is qualitative research. Qualitative research stresses the socially constructed nature of reality and seeks answers to questions that focus on how social experience is created and given meaning. Qualitative research is concerned on individual point of view and believes that it is possible to get close to individuals perspective through detailed interviewing and observation (Silverman 2005, 10)

7.1 Case study

The principle of a case study is to study one case in great detail using whatever methods seen appropriate. While there might be variety of different research purposes and research questions, the general target is to develop as full an understanding of the case as possible. (Silverman 2005, 126) It is not enough just to describe the case but a study should produce explanations that are generalizable in some way. (Silverman 2005, 128)

Methodology is a general approach to studying research topics. (Silverman 2005, 109) Available methods in quantitative research are: observation, textual analysis, interviews and transcripts. The choice between different methods reflects the chosen research strategy. (Silverman 2005, 111) Research strategy in this thesis is an instrumental case study. The aim of the case study is to provide insight to the phenomenon that is being researched by comparing it to established theory. The chosen research method for this thesis is the analysis of written documents, such as letters, articles, legal documentation, study papers and speeches.

The research material for this thesis has been gathered from electronic sources. It is mostly taken from financial newspapers and statements given by financial industry leaders and financial regulators. Most interesting part of the research material is the letters sent between different regulators or between regulators and financial industry leaders. They give an interesting insight on how new regulation is born.

7.2 Reliability and validity

A goal of research is to use measures and observations that are reliable and valid. Reliability in qualitative research means that the observations made from the research material are uniform, accurate, objective and consistent. Validity however, means that the research material itself makes sense, is meaningful and enables the researcher to draw conclusions from the sample to whole population. (Cresswell 2005, 162)

The chosen source for the research material puts the validity of this thesis in doubt. A lot of the used material is taken from sources that are directly linked with financial industry. For example financial newspapers don't have an incentive to disagree with the industry they depend on and quite naturally, the industry itself has no interest in applauding decisions made by regulators that will inherently increase their cost of doing business. The author of this thesis tried to avoid problems with validity by searching for multiple sources for each topic that was being researched. The aim of the author was to perform the research objectively with an outsider's perspective. Sometimes that proved to be hard especially if the author had prior personal opinions on certain topics.

Reliability of the study has been ensured by working meticulously throughout the thesis process. The author has aimed to perform the study with as much care and attention to detail as possibly.

8 Regulation

The over the counter derivatives market was at the center of the financial crisis and several causes of the crisis point to it. Increasingly complex and opaque derivatives products combined with the lack of transparency were contributing factors to the crisis. It must also be noted that the public authorities failed to appreciate and address the risk building up in the financial market. Regulators failed to keep up with market innovation but they also lacked the tools to monitor risk adequately. The explosion of outstanding derivatives volumes outpaced the existing post-trading infrastructure. (Cœuré 2013)

Credit risk exposures related to bilaterally traded OTC derivatives helped to amplify the global financial crisis of 2008. Credit risk exposures were often left uncollateralized. This led to OTC derivatives users recording major losses as counterparty defaults became likely or realized. In addition third parties had little information about these bilateral credit exposures so they became hesitant to provide funding for institutions that may or may not face losses on their derivatives position. (Bank of International Settlements 2013a)

The Group of Twenty derivatives reforms program is a global effort to combat the dangers of derivatives. Local financial regulators have implemented and are in the process of implementing market reforms aimed at reducing credit risk in the OTC derivatives market. The key weapons in the regulators' arsenal is a requirement for standardized over the counter derivatives to be cleared through central counterparty clearing houses, requirements for collateral to be posted for current and potential future credit risk exposures, regardless of the trade being centrally cleared or not and requirements that financial institutions hold additional capital to offset their uncollateralized derivative exposures. (Bank of International Settlements 2013a)

“While these reforms have clear benefits, they do entail costs. Requiring OTC derivatives users to hold more high-quality, low-yielding assets as collateral lowers their income. Similarly, holding more capital means switching from lower-cost debt to higher-cost equity financing. Although these balance sheet changes

reduce risk to debt and equity investors, risk-adjusted returns may still fall. As a consequence, institutions may pass on higher costs to the broader economy in the form of increased prices.” (Bank of International Settlements 2013a)

It is important to understand that the Group of Twenty reform program did not lead to international common financial derivatives standards. The members of the Group of Twenty have in varying speeds and degrees created their own legislation to reform the OTC market. (Valladares 2013, 1)

8.1 Dodd–Frank Wall Street Reform and Consumer Protection Act

The Dodd–Frank Wall Street Reform and Consumer Protection Act or in short Dodd-Frank aims to increase transparency and accountability in the derivatives market. This piece of United States legislature is tasked with protecting U.S. taxpayers against the need for future bailouts and buffers the financial system from unbearable risk taking. The American over the counter market will be regulated by the U.S. Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC). The content of the legislation is similar to the European legislation. (Senate Committee on Banking 2010)

Dodd-Frank provides CFTC and SEC with authority to regulate the OTC derivatives market. The regulatory oversight hinders the possibilities for irresponsible practices and excessive risk taking. The legislation mandates central clearing and exchange trading for derivatives that can be cleared. It provides a role for both clearing houses and regulators to determine which derivatives products should be cleared. Products need to be approved by SEC and CFTC before a clearing house can clear them. The regulation puts safeguards in place for un-cleared derivatives by requiring margin payments for un-cleared trades to off-set the bigger risk they pose to the financial system. Margin payments on un-cleared trades encourage more trading to move to exchanges or clearing houses. Market participants are required to provide their trade data to trade repositories to improve market transparency and provide regulators tools for monitoring and responding to increased risk. (Senate Committee on Banking 2010)

8.2 Agreement on new European rules to regulate Financial Derivatives (EMIR)

The European Parliament and the Council reached an agreement in February 2012 on regulation to increase transparency, stability, and efficiency in derivatives markets. It was the needed step forward in establishing a safer regulatory framework for European financial markets. On July 2012, the regulation on over the counter derivatives, central clearing counterparties and trade repositories was adopted. The regulation entered into force on 16th of August 2012. This regulation enables the European Union to deliver the Group of Twenty commitments on OTC derivatives agreed in 2009. (European Commission 2012)

European Market Infrastructure Regulation or EMIR guarantees that information on all European over the counter derivative contract will be reported to trade repositories and that the information is accessible to authorities. This information is intended to give policy makers and financial supervisors a clear overview of what is happening in the derivatives market. (European Commission 2012)

The regulation mandates that all standard derivative contracts should be cleared through central counterparty clearing houses or CCPs. These CCPs are given strict organizational and business conduct requirements. Trades that are not cleared are to be susceptible to initial and variation margin payments. (European Commission 2012)

8.2.1 Financial or non-financial counterparty

A key concept in the EMIR regulation is the need to be able to regulate the use of derivatives in a flexible way. Therefore, different level of regulation is needed for different types of derivatives users. The Article 2 of regulation (EU) no 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories recognizes three different counterparty types: financial counterparty, non-financial counterparty below clearing threshold and non-financial counterparty above clearing threshold.

8.3 Central counterparty clearing houses

The Bank for International Settlements estimates that strict derivatives regulation can boost global economic output by 0.12% per year. Strict regulation also decreases the potential for financial crises. The Bank for International Settlements sees that regulators and banks should aim to pass the largest possible amount of derivatives trades through central counterparty clearing houses. In their view the market of OTC derivatives should be based around a modest number of central counterparty clearing houses. (Bloomberg 2013a)

The reforms started by the Group of Twenty mandate that central counterparty clearing houses must to be used for chosen OTC derivative contracts. Trades in the OTC market have traditionally been bilateral agreements between counterparties. Introducing a central counterparty clearing house to the market changes the situation. Trades are still negotiated between two counterparts but after the trade has been agreed on, both counterparts submit their trade details to a central counterparty clearing house in which they are members. The central counterparty clearing house approves the trades and becomes a counterparty for both original parties. Now both original parties have credit risk towards the clearing house but have no risk towards each other. Clearing houses are able to manage credit risk by requiring initial and variation margin from the original trade counterparties. Result is a reduction in credit risk not unlike with exchange traded derivatives (Hull 2012, 32) Central counterparty clearing houses increase overall market transparency by maintaining and distributing derivatives contract records, including notional amounts and counterparty identities. (IMF 2010, 98) The use of central counterparty clearing house also reduces derivatives exposures by multilaterally netting them (IMF 2010, 97).

One way for encouraging the use of clearing houses can be found from the Basel III accord for a global regulatory framework for more resilient banks and banking systems. Basel III includes capital incentives for banks to utilize clearing houses for their over the counter derivatives. (Bank of International Settlements 2011, 8) This is done by raising the capital requirements needed for backing the credit exposure rising from uncleared over the counter derivatives. (Bank of International Settlements 2011, 2)

Clearing reduces the effect of a failure of a major market participant because the impact is mitigated and absorbed by the default management protections of clearing houses. If a defaulting clearing member cannot honor its contracts, the losses will be mutualized for all members. In case of a default, the initial margin posted by the defaulting clearing member is used to honor its outstanding contracts. If the amount of initial margin is insufficient, the clearing house seizes the funds the defaulting member has deposited in the guarantee fund of the clearing house. If the deposit from the defaulting member is not enough then the central counterparty clearing house retrieves funds from the whole guarantee fund including contributions of other clearing members. (IMF 2010, 97)

A major indicator of the safety central counterparty clearing houses bring can be found from the Lehman Brothers bankruptcy in 2008. All Lehman Brothers' interest rate swap positions that were cleared in LCH.Clearnet SwapClear settled without difficulties in a few days following the bankruptcy. All other clearing members were paid what they were owed without using Lehman's entire initial margin and without having to resort to the guarantee fund. (IMF 2010, 99)

Even though the regulation is pushing trades to central counterparty clearing houses, there is still a need for non-cleared OTC derivatives. Non-cleared derivatives have a vital role in risk management which cannot always be replicated with clearable instruments. If derivatives users are forced to abandon non-cleared derivatives and replace them with unsuitable or imperfect hedges using only clearable instrument, they might face unwanted basis risk (the risk of the derivatives instrument not protecting from the desired financial risk). (ISDA 2013b, 5)

8.3.1 OTC clearing today

The use of central counterparty clearing houses is commonplace globally although clearing regulation in all jurisdictions has not yet entered into force. The financial industry saw the value of using central counterparty clearing houses for standardized derivatives even before the credit crisis. (ISDA 2013b, 7)

Table 1 shows how the amount of cleared interest rate derivatives has dramatically increased in size between 2007 and 2012. At the summer of 2012, 54.2% of the notional outstanding of interest rate swaps were cleared. This is a big increase compared to the 21.3% just four and a half years earlier. During this time derivative users and central counterparty clearing houses have also reduced the total amount of notional outstanding through portfolio compression. As a result there is less total outstanding derivative notional out of which a bigger percentage has been cleared (ISDA 2013b, 7)

Table 1. Cleared OTC interest rate swaps

	Dec. 07	Dec. 08	Dec. 09	Dec. 10	Dec. 11	June 12
OTC Interest Rate Swaps outstanding - USD trillion	255,2	265,3	241,6	240,1	262,3	246
Cleared %	21,30 %	28,60 %	44,60 %	51,80 %	53,50 %	54,20 %

(ISDA 2013b, 7)

Large central counterparty clearing houses like LCH.Clearnet SwapClear have reported significant increase in the amount of cleared notional. On 28.3.2014 their position of cleared interest rates swaps had a notional outstanding of 233 trillion USD. This is almost the size of the global notional outstanding of cleared and non-cleared trades in mid-2012.

8.3.2 Clearing obligation in Europe

According to the regulation (eu) no 648/2012 of the European parliament and of the Council, all OTC trades suitable for central counterparty clearing must be cleared by the end of 2012. The regulation honors EUs commitment to the Group of Twenty about enforcing a clearing obligation in Europe.

The European Securities and Market Authority (ESMA) is responsible for preparing technical standards for European central counterparty clearing. ESMA is tasked with specifying the class of OTC derivatives that will be subject to clearing obligation and the date when the clearing obligation takes effect. The process of creating these tech-

nical standards will begin when a central counterparty clearing house is authorized under EMIR. ESMA has six months to prepare the standards following the authorization of a clearing house. (ESMA 2013c, 6).

Harry Harrison from Barclays Plc hopes that ESMA would follow USA's example when preparing the technical standards by phasing the start of the clearing obligation. "Staggered implementation of this was key to the success of the roll-out in the US – and Europe has to follow that pattern". In the U.S. even with very clear phasing of different user segments there was still a rush before every phase to onboard in to clearing houses. Harrison says that it might help the implementation if ESMA had the power to give an industry or individual company extra time to comply with the clearing obligation. (ISDA 2014h)

The first central counterparty clearing house to receive authorization under EMIR is Nasdaq OMX. OMX received authorization on 18.3.2014. (NASDAQ OMX 2014) This means that ESMA has until 18.9.2014 to provide standards for clearing. The clearing obligation might be in force earliest 18.12.2014 meaning that all following OTC trades that are technically possible to clear must be centrally cleared. The first clearing obligation will be limited to all or some of the OTC derivatives included in the Nasdaq OMX authorization. Products included in the authorization are:

- Interest rate swaps in DKK, EUR, NOK and SEK.
- Overnight Indexed Swaps in EUR and SEK
- Rate Agreements in DKK, EUR, NOK and SEK

In the beginning non-financial counterparts under clearing threshold are excluded from the clearing obligation as long as the trades are done for hedging purposes. The clearing threshold is so high that it is possible to say that all non-bank corporations are able to trade without clearing in the immediate future. (Nordea Markets 2014b)

The authorization of Nasdaq OMX as a central counterparty clearing house under EMIR has caused commotion in the derivatives market. It has led to a situation where European derivatives users are uncertain how to risk-manage and price EUR denominated interest rate derivatives. The reason can be found from a widely misunderstood frontloading requirement under EMIR. The frontloading requirement mandates de-

derivatives users to backload certain derivative trades to a central counterparty clearing house, specifically those transactions traded between the time when ESMA is told a central counterparty clearing house has been authorized to clear a class of derivatives and the start of the actual clearing obligation. This causes problems because before ESMA is ready with the standards it is uncertain for the market which trades will be captured by the frontloading requirement and at which point in time. (ISDA 2014b)

As mentioned before, ESMA has six months to prepare standards for clearing after they are notified of authorization of a clearing house. These standards will outline which products are mandatory for clearing. After ESMA has prepared the standards, the European Commission has three months to endorse the standards before they are passed to the European Parliament and Council of the European Union which have up to two months to accept them (or six months if the council has modified the rules). After approval the clearing rules are published in an official journal and come into force 20 days later. (ISDA 2014b)

Euro interest rate swaps is the largest class of derivatives in Europe. As Nasdaq OMX received authorization to clear them, it means that any EUR denominated interest rate swap transacted in Europe after 18 March 2014 may need to be frontloaded to a CCP at some unknown time in the future. This uncertainty creates problems for derivatives users. It is not known how individual trades from now on should be treated. Are they cleared, non-cleared or a mixture of both? This is important because cleared and non-cleared trades are subject to different funding and capital requirements. (ISDA 2014b) With trades currently being priced as a bilateral OTC contract, derivatives users can only wonder how that price will change when and if ESMA deems a particular product clearable in future (The Trade 2014b). It is nearly certain that the clearing mandate will apply for EUR interest rate swaps but it is not known when. (ISDA 2014b)

Financial markets had hoped that the European regulators would have provided more information on the frontloading before authorizing a central counterparty clearing house. Without guidance derivatives users have no way of knowing whether any single transaction will ultimately be subject to frontloading or not. The authorization of

Nasdaq OMX came as a shock as the markets was hoping for ESMA to provide guidance first. (ISDA 2014b)

ISDA and another financial industry association FIA Europe have asked ESMA to work with the European Commission and Parliament to resolve the issues over frontloading as soon as possible. In a letter from 20 March 2014 they say:

“Affected OTC derivatives contracts cannot be accurately priced once frontloading is triggered – this in turn reduces market certainty and potentially discourages market participants, including end-users, from comprehensively managing their risk exposures. Swift action is essential to ensure that Europe’s capital markets can continue to serve its end-users and the real economy” (ISDA 2014c)

Chief Executive Officer Simon Puleston Jones of FIA Europe said that ESMA understands why frontloading is problematic to derivatives users, but the issue is now down to politics. “Politicians who agreed on frontloading are now being asked to change their minds.” (The Trade 2014b)

The concerns ISDA and FIA have raised will not have an effect on the already passed regulation. They hope that ESMA takes them into account when preparing the technical standards for clearing. This is a politically difficult situation as agreeing to the industry’s point of view could indicate that the European authorities acknowledge that the regulation might have gone further than needed. Politicians might have hard time doing this. As Simon Puleston Jones says “But they will be wary about doing it because it could set a precedent – agreeing to regulation, only to find years or months later that it is changed” .(The Trade 2014b)

End users of derivatives do not see the obligation to use central counterparty clearing houses as a significant tool to reduce systemic risk. International Swaps and Derivatives Association conducted a survey early 2014 asking buy side derivatives users about their opinion of the effectiveness of the derivatives reform. In general end users feel that the derivatives market is on a sounder footing than before the crisis. About 60% of the survey responders felt that the market is safer now. The reason for the increased safety is unfortunately not due to regulation of derivatives but the actions taken by the

Basel committee on bank capital rules and stricter credit policies. Only 7.1% of respondents said that the requirement to centrally clear OTC derivatives is a very important tool in decreasing systemic risk. In comparison 18.75% said that it is not important at all. (Risk.net 2014f)

The chairman of International Swaps and Derivatives Association Stephen O'Connor finds it interesting that end users do not see the value of clearing as it inherently reduces systemic risk. Eric Litvack from International Swaps and Derivatives Association and Societe General believes that buy side companies are willing to see benefits only in the bank regulatory reform and not in the derivatives reform because the derivatives reform hits them directly. Companies are in favor of moving OTC trades to central counterparty clearing houses and getting the benefits of reduced counterparty credit risk and reduced balance-sheet exposure. But companies are not willing to share in the financial responsibility if a central counterparty clearing house goes down. Financial risk does not go away with clearing since there is always risk in the derivatives market. Clearing houses just mitigate and centralize this risk. (Risk.net 2014e)

Non-financial counterparties under the clearing threshold are not affected by the clearing mandate. But the clearing mandate will have a major impact on for example asset managers who up until now have not been mandated to clear their over the counter trades. These companies will gain benefits of reduced counterparty credit risk through clearing. But unfortunately they will in some cases gain new exposures caused by the daily variation margins payments to central counterparty clearing houses. The need to always have cash to meet variation margin payments can be problematic. Asset managers need to use more repurchasing agreements to handle their variation margin requirements. Asset managers usually use same counterparts in their OTC and repurchasing agreements. So in the case of some asset managers, clearing effectively just shifts counterparty risk from OTC trades to the repurchasing agreements. (Risk.net 2014f)

Although central counterparty clearing houses are designed to mitigate systemic risk, they might actually be a major source of risk. A systemic risk survey published by Depository Trust and Clearing Corporation DTCC in March 2014 shows a growing num-

ber of financial industry participants worried about risk in central counterparty clearing houses. As a result of increasing regulation, clearing houses will house more and more risk. The survey found 18% of respondents, up from 8% in 2013, fearing central counterparty clearing houses could become single points of failure in the market during a financial crisis. (The Trade 2014c)

It is also worth noting that although clearing will become mandatory for certain companies; this does not mean that it will be free. For example SwapClear operated by LchClearnet can charge up to GBP 2.250.000 a year from its clearing members. Other central counterparty clearing houses have similar clearing fees in place. (LchClearnet 2014)

8.4 Trade repositories

One of the root causes for the financial crisis was the lack of transparency in the over the counter derivatives market. There are two dimensions to the lack of transparency: lack of information due to the missing reporting requirements to financial authorities and data fragmentation. These resulted in difficulties for authorities to get a full picture of the derivatives market before and during the financial crisis. (Cœuré 2013)

In practice comprehensive derivative market information was either totally unavailable or incomplete. Even if trade data was available for regulators, it could not be compared across jurisdictions due to different accounting assumptions and valuations. Also, financial innovation that was intended to limit risk, especially securitization and hedging through derivatives, increased the complexity of the financial market and made it difficult to monitor. (Cœuré 2013)

Unlike stock exchanges that were tightly regulated and obliged to disclose information on prices and orders to regulators, over the counter derivatives markets had no such obligation. At the peak of the credit crisis, neither market participants nor authorities were able to monitor the market for credit default swaps. Therefore, it was impossible to evaluate counterparty credit risk correctly. This made it impossible to use credit derivatives that are designed for credits risk mitigation for their original purpose. Since

the crisis, global authorities have implemented regulation ensuring that counterparties report derivatives trades to trade repositories. (Cœuré 2013)

The main objective of reporting to trade repositories, as set by the Group of Twenty, is to improve transparency in the derivatives market. By increasing transparency, authorities can address concentrations of risk and better protect the market against market abuse. Mandatory reporting is also useful in promoting focus on operational and counterparty risk management. A prerequisite for effective reporting is that market participants use automated and centralized post-trade processes. These benefits have a clear effect on the whole financial system. The Group of Twenty has left the implementation of trade reporting to local jurisdictions. (Financial Stability Board 2013, 15)

According to the regulation (eu) no 648/2012 of the European parliament and of the council, counterparties and CCPs that enter into, modify, or terminate a over the counter or exchange traded derivative contract must ensure that the details of that contract are reported to a trade repository. European Securities and Markets Authority (ESMA) was tasked with the practical work to design market practices that improve transparency in the derivatives market, protect against market abuse and mitigate systemic risk. (European Securities and Markets Authority ESMA 2013a, 55)

EMIR mandates that a set of trade information needs to be reported to a trade repository by both counterparties to a trade. These include counterparties to the contract, beneficiary of the rights and obligations rising from it, main details of the contract including the type, underlying, maturity, notional value, price and settlement date. (European Securities and Markets Authority ESMA 2013a, 56)

Reporting of OTC and exchange traded derivatives to a trade repository became mandatory on 12.2.2014. The implementation of trade reporting did not go totally according to plan. Following chapters outline problems caused by missing legal entity identifiers, lack of common reference numbers and lack of global cooperation between financial authorities.

8.4.1 Legal Entity Identifier or LEI

During the years before the financial crisis, many attempts have been made to establish a common global legal entity identifier for the financial industry. Up until recently the industry has failed to overcome the inherent difficulties in setting up such a global system. (London Stock Exchange 2013, 5) Before the crisis there was no commonly accepted, accurate and comprehensive system for the identification of parties to financial transactions (London Stock Exchange 2013, 4).

The onset of the financial crisis exposed fundamental problems in the way financial transactions are made. The crisis showed that major improvements to the world's financial data systems were needed. These improvements should make it easier to settle fundamental questions of ownership and debt liability. One key part of these improvements was to initiate the process of creating a common legal entity identifier or LEI. In essence, the LEI initiative is designed to create a global reference data system that identifies every legal entity in any jurisdiction that is part of a financial transaction. (London Stock Exchange, 5) Trade repositories require that the transactions reported to them use LEI as the method of identification for the parties in all transactions (DTCC, 5).

Only a small number of European derivatives users have so far applied to receive a legal identity identifier. This is disappointing as obtaining a LEI code is a prerequisite for being able to trade derivatives after February 2014. (ISDA 2014a) The Federation of Finnish Financial services estimates that more than 10,000 Finnish entities would need a legal entity identifier but before the February 2014 deadline, only 1166 companies had obtained one. (Risk.net 2014a) In total around 240000 LEIs have been applied for but estimates suggest that over a million identifiers are needed in order to identify all derivatives users. (International Financing Review 2014a)

8.4.2 Unique Trade Identifier or UTI

To be compliant with European trade reporting regulation, parties of a trade must use a common trade identifier when reporting trades to a trade repository. (ISDA 2013a, 4) Unique Trade Identifier or UTI is the method the financial industry has chosen to use

as a common way to identify derivatives transactions. Using a common reference not only enables regulatory compliance but it also provides a common way to identify transactions, promotes efficiency and facilitates global aggregation and reconciliation of trade repository data. (ISDA 2013a, 5-6)

European Securities and Markets Authority did not provide much guidance in how the common trade identifier should be formulated. Both the buy side companies and banks are blaming each other for not being clear on how they will handle the generation of the trade identifier going forward. (Risk.net 2014b). International Swaps and Derivatives Association has prepared standard documentation that the financial industry agrees to follow for the generation of the Unique Trade Identifier. (ISDA 2013a, 4) These standards were not published until September 4th 2013. The standards assign responsibility for creating the UTI to different trade counterparts across a range of situations. (Risk.net 2014c)

The rules are complex and there have been problems in communicating new unique trade identifiers between banks and their counterparts. Due to the tight time constraints it is no wonder that financial institutions and corporations have not had the time to prepare their IT systems and communicate their UTI processes to customers before February 2014. (Risk.net 2014c)

8.4.3 Trade reporting in reality

Under EMIR the obligation to report trades to trade repositories covers all OTC and exchange traded derivative contracts. All underlying asset classes are in scope including interest rate, FX, commodity, credit and equity derivatives. The reporting obligation started on 12.2.2014. Meaning that, all contracts entered into on or after reporting start date 12.2.2014 have to be reported to a repository by the end of next business day. Financial Institutions like Nordea Bank Finland offer their customers a service where the bank reports new and historical derivative contracts to a trade repository. This means that the customer does not need to be actively involved in the reporting process. (Nordea Markets a. 4) It is still important to remember that if a company chooses to let their bank counterparts handle trade reporting, they still need to verify the re-

ported data is correct (ISDA 2014a). Banks do not assume liability for incorrectly reported trades; neither does the standard reporting delegation agreement from ISDA (Risk.net 2014c)

In order for the reporting to be accurate, there are some actions all entities, even small companies, entering into derivative contracts need to take. Entities are mandated to acquire a LEI code for their company and inform it to their trading counterparts. Entities need to verify that the classification of their company as financial counterparty, non-financial counterparty below clearing threshold and non-financial counterparty above clearing threshold has been correctly done by their trading counterparts. Non-Financial counterparts must also inform their counterparts if the contracts they are entering into are done due to speculative reasons. It is every entity's responsibility to provide this data to their trading counterparts or else they will not be in compliance with EMIR regulation. (Nordea Markets a. 5)

8.4.4 Illusion of clarity

An editorial in Bloomberg news highlights a problem in regulatory trade reporting. It raises a concern that across the globe in 11 different jurisdictions 22 different trade repositories collect derivative trade data, each with their own reporting requirements formats and legal mandates. The regulators in charge of overseeing the financial system have much more data than they had before the financial crisis but they are not capable of using said data. The noble idea of the Group of Twenty to concentrate derivatives data has been undone by local regulators not working together. Financial Stability Board mandated by the Group of Twenty is studying possibilities to aggregate trade data across repositories in different jurisdictions. This would require that regulators around the world coordinate their work, harmonize reporting rules and gather trade data in compatible formats. (Bloomberg 2014a)

Robert Pickel the chief executive officer of the International Swaps and Derivatives Association ISDA shares the concerns of the editorial staff of Bloomberg. He feels the sheer volume and inconsistency of trade data collected by trade repositories is a major problem that will only get worse as more and more trade reporting mandates come

online. He feels that the work the Financial Stability Board has started in order to harmonize reporting data will eventually enable regulators to obtain a clear view of the market and help them spot the buildup of systemic risk. The fact is that at the moment regulators do not have a clear picture of the market and the situation will remain the same until a new and viable reporting mechanism is in place. As a spokesperson for the financial industry Pickel blames the regulators by saying “Given the time, expense and resource that everyone – dealers, end-users and infrastructure providers – have put into meeting the mandates, it is disappointing a global framework for consistent data reporting wasn’t put in place by regulators from the start.” (ISDA 2014a) Pickel’s opinion is in line with an earlier statement from the International Monetary Fund: “Ideally, there should be a single trade repository for each product type that collects and shares information in ways that are useful to the relevant authorities.” (IMF 2010, 99)

The problems with the reported data have not gone unnoticed by the authorities. Trade reporting has been mandatory in the USA since spring 2013. In a recent speech Mark Wetjen, the chairman of The U.S. Commodity Futures Trading Commission, said that the data provided to them has not been clean enough for them to make sense of it as quickly and easily as they want to. Scott O’Malia, a commissioner in The Commodity Futures Trading Commission, voiced the same concerns already in March 2013, saying the data was not giving the regulators a full picture of the swaps market. The data was not sufficient to help regulators detect the kind of losses that occurred during the financial crisis. O’Malia pushes the responsibility to the regulators saying “The commission needs to be precise about what it wants from the market.” In order to remedy the situation, The Commodity Futures Trading Commission has approached existing trade repositories asking their opinions about how to report trades. (Bloomberg 2014b)

8.4.5 Criticism over the reporting mandate implementation in Europe

European derivatives users have had hard time adjusting to the new reporting rules. The scope of the reporting mandate is vast, capturing all asset classes at once without any phasing in. Including OTC and exchange traded derivatives at the same time adds to the confusion. ESMA only officially confirmed that exchange traded derivatives

need to be reported in September 2013. This left derivatives users with only a little time to prepare before the reporting mandate came in to force in February 2014. (ISDA 2014a)

The regulators failed to properly instruct market participants on how to report data subject to privacy laws. It was unclear how to report non-cleared trades that are subsequently cleared. It was not known if a trade notional amount needs to be re-reported as it changes overtime. There was a lack of guidance how to report complex or bespoke trades where each market participant could in theory use different trade capture models. (ISDA 2014a)

Even though trade reporting became mandatory in the European Union on 12.2.2014, some companies have been very late in their actions to comply with the regulation. Companies like MarkitServ which provide, regulatory reporting services to buy-side companies have informed that companies were still approaching them for reporting services after the reporting mandate came to effect in mid-February 2014. They feel that there has been a signal from regulators that there will be some leniency for companies that are showing best efforts to comply with the reporting mandate even if they are unable to comply. (The Trade 2014a)

Even companies that are compliant in theory have faced technical reporting problems. Some market participants have not been able to report their trades due to backlogs in trade repositories during onboarding. The problems ranged from not being able to submit data to repositories to not being able to access already reported trade data. (The Trade 2014a)

One of the trade repositories that struggled with technical problems was the Depository Trust & Clearing Corporation DTCC. Their chief executive Sandy Broderic partially puts the blame on the way the European regulation was implemented. It required both exchange traded and over the counter derivatives to be reported by each party to a trade. It also called for reporting to start on the same date for all instruments and all market participants. In other jurisdictions, for example in USA, reporting requirements

have been phased in over time which helped to spread the initial workload. (Risk.net 2014d)

Verena Ross, Executive Director from The European Securities and Market Authority ESMA asked in an August 2013 letter to the European Commission to postpone the reporting requirement of exchange traded derivatives by one year until end of January 2015. She stated that the technical standards on reporting to trade repositories did not adequately distinguish between OTC and exchange traded derivatives. The one year postponement would have allowed ESMA to provide further guidance and given the market participants more time to prepare for reporting. Her fear was that reporting exchange traded derivatives already from 2014 would prove inconsistent and would not serve the purposes of the regulation. (ESMA 2013b) The European Commission did not agree to ESMA's request. Patrick Pearson, head of financial markets unit in European Commission stated "The decision has been taken that the deferral ESMA suggested will not take place. ESMA is now engaged – and, I think, working – on a set of clarifications for the industry, through FAQs, to ensure the guidelines and guidance is out there as soon as possible for industry to start working on its systems" (Risk.net 2013) ESMA did provide further clarification in FAQ documents. The last one being released only six hours before the reporting mandate entered into force in February 2014. (Risk.net 2014g)

A major problem for trade reporting in Europe is that there are different definitions for derivatives in different European Union member states. On 14.2.2014, ESMA wrote a letter to Michel Barnier, commissioner for internal markets and services at the European Commission, asking for clarity on the definition of derivatives within the European Market Infrastructure Regulation. In the letter, ESMA states there is no single, commonly adopted definition of a derivative in the European Union because the scope of financial instruments under the Markets in Financial Instruments Directive MiFID was subject to interpretation in member states. This is especially true for FX forwards and physically settled commodity forwards. There are big differences in what is considered to be a FX spot and what an FX forward within the European Union. ESMA asks the European Commission to provide clarification urgently in order to ensure a consistent application of EMIR regulation. Until the European Commission

provides clarification, ESMA states it understands if national authorities will not implement the relevant provisions of EMIR for contracts that are not clearly identified as derivatives across the Union. (European Securities and Markets Authority ESMA 2014)

The first few weeks of European trade reporting have already indicated that the reporting implementation did not go according to plan. Both Depository Trust & Clearing Corporation DTCC and Unavista, a trade repository run by the London Stock Exchange, report that approximately half of the trades reported to them cannot be matched. The situation with OTC trades is marginally better than with exchange traded derivatives. The reasons for the poor matching records can be found from the trade data provided to the depositories. The counterparties to a trade are not always reporting trades to repositories in the same way. There are approximately 80 data fields that must be reported so it is no wonder that breaks in the reporting are frequent. More problematic is that some companies have started reporting without a LEI or UTI which makes it impossible to find their counterpart to the reported transaction. This leads the repository to consider two sides of the same transaction to be two totally unrelated unreconciled transactions. (Risk.net 2014g)

If trade counterparts are unable to provide key matching fields like UTI and LEI, then trade matching is not possible. Unavista believes that it will take months before the reporting process runs smoothly. As all asset classes and users were mandated to start reporting on the same date, it will take months for the regulation and technical standards to evolve and standardize. (Risk.net 2014) Lee Betsill from CME Clearing Europe feels that the European reporting mandate was rushed into place and the inclusion of exchange traded derivatives now seems like a mistake. (International Financing Review 2014a)

The European Securities and Markets Authority has a different view on the success of the implementation. Olga Petrenko, market integrity officer with ESMA said that problems in reporting were expected and stressed the large amount of work required by the industry. She spoke in International Swaps and Derivatives association's annual general meeting in Munich. "Given the short time frame, reporting was done pretty well. In the

last 17 months we've managed to come up with implementing measures and the industry was able to digest those requirements, to accommodate the systems and stand ready to submit the reports". She continued saying that the regulators had no expectations that the reporting would run smoothly from day one. In regulator's view point the implementation was satisfactory. In ESMA's opinion problems and are challenges a natural part of the switch to Europe's new reporting rules. (Risk.net 2014i)

A survey conducted by International Swaps and Derivatives Association shows that end users of derivatives fail to find benefits from mandatory trade reporting. More than 55% percentages of them find the trade reporting requirement to be unimportant or only marginally important in improving market stability. A big part on end user opinion could be found from the near catastrophic launch of trade reporting in Europe (Risk.net 2014f)

8.5 Margin requirements for non-centrally cleared derivatives

The Group of Twenty agreed in 2011 to add margin requirements for non-centrally cleared derivatives to their derivatives market reform program. They asked the Basel Committee on Banking Supervision and the International Organization of Securities Commissions to develop consistent global standards for margin requirements. They released two consultative papers in July 2012 and February 2013. They invited market participants to comment on the working papers. After the comment rounds and a quantitative impact study they released the final regulatory framework in September 2013. (Bank of International Settlements 2013c, 1)

The introduction of margin requirements for non-centrally cleared derivatives has two major benefits: Reduction of systemic risk and promotion of central clearing. (Bank of International Settlements 2013c, 2)

Only standardized over the counter derivatives are suited for central clearing. A major part of existing derivatives are not standardized and cannot therefore be cleared. International Monetary Fund estimated in 2010 (IMF 2010, 101) that one quarter of interest rate swaps, one third of credit default swaps and two thirds of other over the counter

derivatives are not sufficiently standardized and liquid enough to be centrally cleared. These non-standardized non-cleared trades totaling hundreds of trillions of dollars in notional amounts pose major systemic contagion and spillover risk. Imposing margin requirements for non-centrally cleared derivatives is expected to reduce systemic risk by making sure that collateral is available to offset possible losses caused by a default of a counterparty. Margin requirements are also seen to have macro prudential benefits by limiting the increase of uncollateralized exposures in the financial system (Bank of International Settlements 2013c, 2)

Following the decisions made by the Group of Twenty, central clearing will be mandatory for most standardized derivatives. The use of a central counterparty clearing house increases the cost of entering into standardized derivatives contracts. The costs are incurred from the margin that has to be paid to the clearing house. Imposing a similar margin requirement for non-cleared trades increases their cost, reflecting the inherently high credit risk of bilateral derivatives contracts. This is hoped to move trading to products that are suitable for central clearing. (Bank of International Settlements 2013c, 2) Financial institutions might need as much as 6.7 trillion U.S. dollars in additional collateral to comply with new bank capital rules and swaps-clearing mandates. (Bloomberg 2013b)

8.5.1 Principles of margin requirements

The regulators have outlined eight key principles for the use of margins.

Suitable margining processes should be in place for all derivatives contracts that are not cleared by a central counterparty clearing house. (Bank of International Settlements 2013c, 4)

Financial institutions and systemically important non-financial institutions that engage in non-centrally cleared derivatives contracts must exchange initial and variation margin. Margin is calculated from the counterparty credit risk posed by the contracts. (Bank of International Settlements 2013c, 4)

The methodology for calculating the potential future exposure (initial margin) and current exposure (variation margin) should be consistent across entities covered by the requirements. The calculations must ensure that the risk exposure for the portfolio of derivatives is fully covered by margins. (Bank of International Settlements 2013c, 4)

The assets used for margin should be highly liquid and should be able to hold their value in time of a financial crisis. This is needed so that assets collected as collateral can be liquidated in a reasonable time to generate proceeds that protect the collecting entity in the event of counterparty default. (Bank of International Settlements 2013c, 4)

Initial margin has to be exchanged by both parties, without netting of amounts, and held in such a way that the collected margin is immediately available to the collecting party in the event of counterparty default and that the posting party is fully protected in the event that the collecting party enters bankruptcy. (Bank of International Settlements 2013c, 4)

Derivatives contracts between a company and its affiliates should be subject to regulation consistent with each jurisdiction's regulatory and legal framework. (Bank of International Settlements 2013c, 4)

In order to ensure consistent and non-duplicative regulatory margin requirements, regulators across jurisdictions must interact with each other's. (Bank of International Settlements 2013c, 4)

To limit transition cost and allow for establishment of proper regulatory framework, the margin requirements must be phased in over an appropriate period. Regulators must undertake a coordinated review of margin standards in order to assess the overall efficiency of margining and to ensure harmonization across jurisdictions. (Bank of International Settlements 2013c, 4)

Variation margin requirements will apply in Europe for non-cleared trades starting from 1.12.2015. Initial margin requirements will be phased in between 1.12.2015 and 1.12.2019. (Bank of International Settlements 2013c, 23) Non-systemically important

non-financial institutions will be exempt from posting margin on non-cleared transactions. This does not mean that they bare no expenses for the margining requirement. Derivatives dealers will face funding and capital costs from entering into non-collateralized trades and may pass some or all of these costs onto their customers. (ISDA 2014f, 4)

8.5.2 Criticism concerning initial margin

Regulation mandating margin payments for non-cleared OTC derivatives has important implication for financial risk management, the financial markets and the global economy. The proposed regulatory reform of non-cleared OTC derivatives could unfavorably affect the use of non-cleared products and negatively impact the economy. (ISDA 2013b, 5)

The percentage of cleared interest rate swaps has grown rapidly over the last decade. This growth is destined to continue until upwards of 70% of global OTC derivative transactions are cleared. The remaining non-cleared part of the OTC derivatives market will remain important to the global economy. They are used by corporations, investment and pension funds, governments and financial institutions to run their business and to manage risk. The cost associated with regulatory proposals regarding margin requirements for non-cleared trades are a significant threat to the functioning of non-cleared OTC derivatives market. (ISDA 2013b, 3)

Several large OTC derivatives market segments, including most of interest rate swaptions and options, cross-currency swaps, single-name credit default swaps and multiple types of equity and commodity swaps, will likely remain non-cleared. They do not fit the eligibility requirements of clearinghouses. (ISDA 2013b, 4)

Above mentioned and many other non-cleared OTC derivatives have a vital role in risk management that cannot be filled by clearable instruments? If derivatives users are forced to abandon non-cleared trades and replace them with imperfect or unsuitable hedges using only cleared instruments, they might be exposed to unwanted basis risk. As a result, user may reject their hedging strategy altogether and remain exposed to

financial risk they previously were able to hedge. Even worse would be if companies preferred not to take the underlying financial risk in the first place which could have a dampening effect on economic growth. (ISDA 2013b, 5)

The margin framework for non-cleared derivatives consists of two elements: variation and initial margin. Many OTC derivatives transactions already currently involve the payment of variation margin. Like explained in the collateralization chapter, variation margin is a tool that is used to avoid the build-up of unsecured risk between trade counterparties. Valuation margin is posted as a trade's market value changes, basically a daily settlement or collateralization of amounts owed. ISDA survey from end of December 2012 showed that more than 70% of all OTC derivatives contracts were subject to variation margin calls. (ISDA 2013b, 8) The same survey sampled as of end of December 2013 showed that approximately 91% of all OTC derivatives contracts were subject to margin agreements. (ISDA 2014g, 3)

History has proven that frequently settling unrealized market value changes between two parties using variation margin is an effective way to reduce counterparty credit risk. The situation with initial margin is problematic. Initial margin is a safety barrier used to cover replacement costs if a counterparty defaults. It is an additional payment done between counterparties of a trade in excess of amounts owed. Posting initial margin improves the situation of the non-defaulting party and reduces default contagion but the gains come with high costs. Requirement to post initial margin can greatly strain the liquidity and financial resources of the posting party. The strain could cause the posting party to default. Therefore, initial margin requirement may introduce a potentially large amount of risk to the financial system. The good thing with initial margin is that only the defaulting party ends up paying for the costs of the default. (ISDA 2013b, 8)

Mandating the use of initial margin has benefits, but they come at a huge cost. Regulators must weigh the benefits in relation to the costs involved. The estimated cost of the mandatory initial margin, could run to multiple trillions of U.S. dollars (ISDA 2013b, 9)

The regulatory treatment of non-cleared OTC derivatives must be based on their underlying risk characteristics as well as on their significant uses. Proposals that significantly increase their costs could have significant unwanted consequences on economic and financial market activity. (ISDA 2013b, 22)

Over 85% of repliers to an ISDA derivatives end user survey say that being able to use OTC derivatives for their risk management purposes is either important or very important. It is clear that the demand for OTC derivatives remains strong even while regulation gets tighter. (ISDA 2014e)

The chairman of International Swaps and Derivatives Association Stephen O'Connor summarizes the opinion of the financial industry on regulation that makes OTC trading more difficult.

“As the OTC derivatives market continues to evolve amidst significant changes, it is clear that end-users around the world want and need the ability to use these instruments to manage the risks arising from their business and financing activities. ISDA is committed to ensuring that this most important of constituencies continues to realize the benefits of OTC derivatives by working with them and with global policymakers to build safe, efficient markets.” (ISDA 2014d)

8.6 Credit risk mitigation techniques

EMIR regulation puts in place a number of smaller credit risk mitigation techniques. These mainly govern the way trade counterparts should exchange trade documentation and reconcile their trading books.

8.6.1 Portfolio reconciliation under EMIR

Portfolio reconciliation is one of the credit risk mitigation techniques that EMIR introduces. Before a financial and a non-financial counterparty enter into an OTC trade, they are mandated to agree in writing, how they will reconcile the portfolio of trades between them. (Article 13(1) of Regulation (EU) No 149/2013)

The reason for performing the portfolio reconciliation is to identify at an early stage any possible discrepancies in the economic terms of the OTC derivative contract. (Article 13(3) of Regulation (EU) No 149/2013) The counterparties of the OTC contract can use the services of third party vendors to perform the trade reconciliation.

In order to make sure that the portfolio reconciliation is a proportionate risk mitigation tool, the frequency of the portfolio reconciliation should be different based on the size of the portfolio. More demanding reconciliation requirements will apply to both financial counterparties and non-financial counterparties that exceed a set clearing threshold. Lower requirements will apply to non-financial counterparts that do not exceed the set clearing threshold. (Article 1(29) of Regulation (EU) No 149/2013)

8.6.2 Timely confirmation under EMIR

Those OTC derivatives contracts that cannot be centrally cleared have to be confirmed with trade counterpart in a timely manner (Regulation (EU) No 149/2013). The new EU regulation states that it is essential that the terms of a derivatives contract are confirmed as soon as possible following the execution of said contract. This is especially important if the contract is electronically executed. The reason for the confirmation is to ensure a common understanding and legal certainty of the terms of the contract. (Regulation (EU) No 149/2013)

8.6.3 Portfolio compression under EMIR

Another European risk mitigation technique is called portfolio compression. Portfolio compression can be an efficient risk mitigation tool depending on the portfolio size, maturity, purpose and degree of standardization of OTC derivatives contracts. (Article 1(30) of Regulation (EU) No 149/2013) Financial and non-financial counterparties that have a portfolio of more than 500 outstanding bilateral OTC contracts must establish procedures to analyze the possibility to conduct a portfolio compression exercise. The exercise reduces counterparty credit risk. (Article 14(1) of Regulation (EU) No 149/2013)

Banks are already using portfolio compression to decrease their derivatives exposures and shrink balance sheets. This is done in order to comply with Basel III ahead of time. Portfolio compression can be done with the assistance of third party vendors like TriOptima. Their triReduce service has been in use since 2003. (Reuters 2013) Portfolio compression is conducted in the interest rate swap market. Compression gives swap dealers, with considerable pay and receives swap activity, a tool to terminate large amounts of offsetting contracts before their maturity. The benefits of portfolio compression include reductions in credit risk exposure and operational risk. Also as contracts are eliminated, capital cost can be reduced. (ISDA 2012, 1)

In a portfolio reconciliation exercise, a number of swap dealers aim to eliminate trades where the risk of those trades offset one another. Swap dealers provide the compression vendor a list of their trades and the parameters on how much the compression can affect the trade portfolio's interest rate risk. The vendor compiles the parameters from the participants and fully or partially terminates the offsetting trades involved in the exercise. (ISDA 2012, 2)

8.7 The value of over the counter derivatives market

The derivatives reform program has mobilized the financial industry to defend the use of over the counter derivatives. The defense is based on the flexibility over the counter derivatives offer in comparison to exchange traded derivatives. The key talking points of the industry are:

- There are not always suitable exchange traded derivatives available to replace over the counter hedges
- Over the counter hedges can be more effective and efficient as compared to exchange-traded alternatives
- Over the counter hedges can reduce earnings per share volatility as compared to the exchange-traded alternatives
- Marking to market and the resulting margin requirements can impact the liquidity of non-financial firms and increase costs of operations
- Exchange-traded derivatives can lead to increased ineffectiveness and as a result the hedge might not qualify for FAS 133 hedge accounting

(ISDA 2014f, 51)

It is not just the financial industry that has moved to defense positions. In the USA, traders have been reporting derivatives transactions to trade repositories and have been required to use central counterparty clearing houses since 2013, while European regulators are still defining their requirements. Alan Haywood, an executive in BP Plc criticizes the market fragmentation the Group of Twenty reform has created. He said “As an international company working with international counterparties, we want regulation to be pretty consistent worldwide.” (Bloomberg 2014c)

9 Conclusions

The aim of the reforms initiated by the Group of Twenty in 2009 was to reduce systemic risk in the financial market. The regulators in European Union have spent the following years implementing regulation that follows the principles set out in the reform program. Initially the derivatives reform program consisted of following principles:

- All standardized OTC derivatives should be traded on exchanges or electronic platforms, where appropriate.
- All standardized OTC derivatives should be cleared through central counterparties (CCPs).
- OTC derivative transactions should be reported to trade repositories.

In 2011, the Group of Twenty supplemented their 2009 reforms with a request for regulators to devise proposals to improve margin arrangements in the non-cleared OTC derivatives market.

European legislators have implemented or are in the process of implementing all of the Group of Twenty derivatives reform principles. Some of the regulation is part of European Market Infrastructure Regulation EMIR and some are regulated in revised rules for Markets in Financial Instruments Directive (MiFID/MiFIR). On top of the Group of Twenty reforms, European regulators have also implemented additional systemic risk mitigation actions. These are the requirement to perform portfolio reconciliation with trade counterparts, the requirement to confirm trades in timely manner and to perform portfolio compression exercises. The regulation meeting the requirement that all standardized OTC derivatives should be cleared on exchanges or electronic platforms is far from being completed. It will be part of MiFIR regulation that is not expected to be in place before late 2016 or early 2017.

9.1 Trade reporting

The confusion caused by the broad scope of European trade reporting mandate is threatening to undermine the original Group of Twenty commitment to bring safety

and transparency to the financial system. Trade repositories have said that most counterparties are sending data into repositories but the whole point of reporting is that trade repositories must capture 100% of derivatives trades for central banks to have a proper view on systemic risk.

European derivatives users bear a larger regulatory burden than that faced under parallel U.S. regulation. The U.S. Dodd-Frank act places reporting requirement on swap dealers and it does not extend to exchange traded deals. The regulators in Europe chose to start with a big bank where all derivative counterparts must report all their trades starting at the same time. Most financial institutions adapted to the regulation pretty quickly but much of the corporate world has not yet come onboard.

The scope of the European regulation makes it very difficult for the authorities to reconcile the vast amounts of trade data. The dual reporting rules that mandates even small companies to report their trades, extends the amount of possible reporting entities to over a million. In comparison the U.S. reporting regulation only affected 25 largest swap dealers in the first wave of implementation.

The vast amount of affected corporations and the lack of common way to identify counterparts made reporting mandate implementation very hard. The technical standards for trade reporting in Europe were published in December 2012. It was an ambitious goal that the financial industry would have time to develop the needed legal entity identifier and assign it to over a million entities before reporting start date 12.2.2014. It is clear that the regulators themselves were also struggling under the reporting implementation. Like mentioned earlier the last instructions by European Securities and Market Authority on trade reporting were given to the markets as late as six hours before the mandatory reporting began. Quite surprisingly the European regulators are satisfied with the way reporting started in Europe. Their opinion is in stark contrast to the financial industry's opinion.

Political decisions also played a part in the poor start to reporting. The regulators responsible for the creation of the reporting standards asked politicians to postpone the reporting of exchange traded derivatives by a year. This would have given the regula-

tors more time to prepare better reporting rules. Unfortunately the European Commission ignored the opinion of their own regulatory experts. Trade reporting also stumbled on mistakes done in previous legislation. The lack of common definition for derivatives can be directly linked to the way that the Markets in Financial Instruments Directive MiFID was implemented in European Union member states.

The poor start for trade reporting has two negative effects. First of all it creates an illusion of market transparency. The regulators have access to massive amounts of trade data but according to major trade repositories, the data quality is subpar. In a best case situation the trade data is difficult to use for regulators but in a worst case scenario they might make ill-informed decisions based on poor quality data.

The financial industry and derivatives end users have spent huge amounts of money and time to comply with the regulation. Unfortunately that investment seems to be paying less dividends than expected. The sheer amount of work needed to comply with sometimes poorly implemented and complex regulation triggers a completely new kind of operational risk. The employees who normally would be monitoring risk have often been moved to prepare for the post crisis regulation. This means that the core function of risk monitoring can get compromised.

The promise behind the Group of Twenty reforms was to create global market transparency and monitoring tools for regulators. The reporting mandate in Europe has so far failed to deliver on that promise.

9.2 Clearing obligation

The use of central counterparty clearing houses is nothing new in the over the counter derivatives markets. The benefits that can be gained from lowered counterparty credit risk have been utilized by the market for years. The fact that the cleared trades of Lehman Brothers were closed out in 2008 without expenses to other clearing members is a testament to the effectiveness of central clearing.

The European clearing obligation mandates the use of central counterparty clearing houses for certain standardized products. These products have not yet been specified. The way that the regulation has been written has caused a major pricing problem in the OTC market. A concept called frontloading makes it very difficult to price interest rate swaps up until the moment when the regulators publish technical standards for clearing.

This is a risk that was raised by the financial industry way in advance but the European Securities and Market Authority failed to act before the risk materialized. Now politicians, regulators and financial industry are scrambling to find a solution that is politically and financially acceptable.

The obligation to use central counterparty clearing houses might in a worst case scenario be a big source of systemic risk. The credit risk normally faced by trade counterparts is bundled into risk in a clearing house. If something catastrophic were to happen to one of the central counterparty clearing houses, the ripple effect would be felt throughout the financial system. The fall of individual banks or insurance companies would be small in comparison to a central counterparty clearing house defaulting. Robert Lee the head of systemic risk management of Deutsche bank jokingly spoke in 2013 ISDA Annual General Meeting in Singapore about the disaster that would result if a CCP defaulted. The crowd, including the thesis author, laughed but it is certain that no one would be laughing if it happened in real life.

Many end users of derivatives question the whole need for the clearing obligation. Only a small percentage sees clearing as an effective way to combat systemic risk. To the contrary a growing number of buy side derivatives users fear the risk of a central counterparty clearing house going down.

9.3 Margin requirements

The practice of posting variation margin with OTC trade counterparts is a historically proven way to limit credit risk in derivatives. Derivatives master agreements have been supplemented for years with credit support annexes where trade counterparts agree to

post daily collateral to offset the changes in the valuation of bilateral derivatives contracts i.e. variation margin. The latest ISDA margin survey showed a significant increase in the use of variation margin during the last year.

The upcoming European regulation would mandate the posting of variation margin and initial margin for trades that are not eligible for central clearing. The financial industry sees the initial margin requirement to be a danger to the global economy because it could make hedging of financial risk difficult in the future. In order to hedge financial risk with a non-clearable trade, a derivatives user must be willing to post a large initial margin to their counterpart. Posting initial margin would cause a strain to the financial situation of the posting counterpart. As an option, derivatives users should either use clearable instruments that do not always properly match the underlying financial risk i.e. they contain basis risk or forgo hedging completely. In a worst case scenario the company might decide not to even perform the activities that are the cause of the financial risk. This would mean a decrease in overall economic activity. All mentioned options are highly undesirable.

9.4 To conclude

At this point it is hard to say anything certain about the effectiveness of the European regulation. What can be said is that the implementation has not gone as well as it should have. Mandatory trade reporting and clearing obligation have both faced difficulties during implementation. The requirement for margin payments on un-cleared trades has the potential to have negative impact on the possibility to hedge financial risk. What is more alarming than the problems in implementation is the fact that the corporations using over the counter derivatives to hedge their risks disagree with regulators about the importance of the derivatives reform.

The financial industry seems to be increasingly worried about the reforms. ISDA published four separate studies and one derivatives user survey in April 2014 supporting the use of over the counter derivatives. The headlines in the financial news papers during ISDA's annual general meeting in April 2014 were filled with defense for over the counter derivatives and warnings to regulators about the impact of regulation. In fact

the discussion topics of ISDA's annual general meeting were all related to the derivatives market reform. It is easy to claim that the financial industry just wants to defend its products but they seem to be genuinely worried about the impact of the reforms in global economy.

10 Additional research topics

Although the cost of over the counter derivatives trading is perceived to be increasing as a result of the Group of Twenty reform program, the OTC market has not fallen out of favor: 85.9% of respondents to a 2014 ISDA survey said OTC derivatives are important or very important to their risk management. Approximately 64% of respondents believed their use of OTC derivatives would stay the same and 14.8% said it would increase. (Risk.net 2014f) This indicates that derivatives users are willing to continue using OTC derivatives even though regulators try to push trading to exchanges and to central clearing. It would be interesting to study how trading habits change overtime as a result of regulation.

One topic that keeps appearing in financial news is global market fragmentation. The fact that local jurisdiction were left to implement the reform program on their own has created very different styles of regulation. It would be interesting to study what kind of impact different rules in different geographical areas have on the global economy.

It is certain that regulators, financial institutions and academics will in the future study how the regulation has succeeded in limiting systemic risk. The topic would be an interesting follow-up for this thesis. There should be ample research material available once the current trade reporting problems are solved. One could hope that future studies might even result in a commonly accepted definition for systemic risk.

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