The Effects And Regulations of Derivatives

- A qualitative research of empiric studies and current regulations.

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Abstract

This thesis has focused on how financial derivatives can affect the underlying spot market and how regulatory measures have or have not been sufficient. It is a qualitative thesis in its nature and uses empiric research to show how the theoretic anticipated effects do- or do not come to life. The research is based on four main anticipated effects; on systematic risk, volatility, individual behavior and liquidity. The results are clear and show how systematic risk and volatility did not increase significantly when a derivative trading was introduced on the underlying asset, and how liquidity in the underlying security seemed to increase and decrease in some cases. The concern that derivatives cause declining levels of liquidity in the underlying security is therefore partly intelligible. The effect on individual behavior is controversial and there were evidence on negative effects on individual behavior. It does seem like regulatory measures are in many cases well founded, but its reactive nature is worrying.

Preface

Financial markets have been through some turbulent years during the last decade. The credit crisis that unfolded in the US real estate market at the end of 2008 would probably be the one that most people still remember. The large amounts of defaults on mortgages caused big banking institutions to tumble due to low equity demands and quite possibly excessive speculative behavior. During the last crisis the securitization of financial markets has got quite a bit of attention and the use of derivatives has been a common topic in many regulatory institutions as well as in the financial press. This is actually a topic that has been discussed for many decades, and in the US, the Securities and Exchange Commission (SEC) had been prompted to re-evaluate risk disclosure requirements for investors that sell these products, long before the new millennium (Koski and Pontiff 1996). In Norway, several municipalities claim to have bought some of these heavily re-wrapped securities, without really understanding the product. When the products turned into bad investments, the municipalities had to take on big losses on behalf of their inhabitants. In the aftermath, The Financial Supervisory Authority of Norway has demanded a certain level of expertise to be allowed to buy/sell these products (Finanstilsynet 2011).

Summary

The intention behind this thesis is to understand the need for regulations on derivatives. To be able to address this matter I have based the need on four relationships that can be affected by the introduction of derivatives; systematic risk, volatility, individual behavior and liquidity. Current regulations such as the Basel Accords will be considered and analyzed in detail to see whether they are sufficient or if it is room for improvement. The Form 10-Q is also introduced and discussed in regards to regulations.

The thesis is divided into three parts. The first part takes a look at the presumed negative effects that derivatives may cause, namely increased levels of systematic risk and volatility. It also deals with how individual behavior can be affected by the incentives that lies within derivatives markets. The second part focuses on how the introduction of derivatives can lead to increased levels of liquidity in the underlying, a pre-assumed positive effect. The roles of two vital participants in the derivatives markets are also introduced; they are speculators and market makers. The third part focuses on the current regulations that cover derivatives, the Basel Accords and the Form 10-Q. After this theory is presented the thesis goes on to look at empiric research on the different areas. I have chosen to gather ten different studies on each of the presumed effects in tables and make a discussion on the basis of what the results shows. These studies are quantitative in its nature and I will use them to try and conclude if some of the effects are significant.

The analysis on systematic risk and volatility are unambiguous in their results and shows no significant tendencies of increased levels after the introduction of derivatives trading. The analysis on individual behavior shows how human behavior is affected by risk and incentives and how it might not always be the rational action that is taken, considered from an objective perspective. The empiric research on human behavior shows several issues of how derivatives trading affect human behavior. The results on how liquidity is affected by the introduction of derivatives are less unambiguous, and three out of then studies find that the level of liquidity in the underlying securities drops after the introduction. These results are in line with theory that point to how liquidity is sacrificed for lower levels of volatility.

The Basel Accords has by no doubt been a positive contribution for setting the focus on capital standards in regards to the different types of risks that financial institutions meet.

There is also no doubt that the focus on managerial design towards internal controls and guidance towards derivatives are a pillar that has served its credit by right. The form 10-Q is an important informational retrieval of a company's financial information for other market participants so that they can make optimal and informed decisions. The conclusion is that regulatory measures have been designed in a sensible way and much of the focus on future regulations seems well grounded, especially Central Counterparty Clearing. However, the worry is how all of these regulations are largely reactive in the sense that they are a reaction to a crisis that has already unfolded.

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1. INTRODUCTION

1.1 Background

Derivatives have roots back to the time when Aristotle lived, but the first ever standardized exchange-traded futures found place at the Chicago Board of Trade in 1864 (Wikipedia). This contract was based on grain trading and it started a trend that reached India and the cotton-market in 1875. Also at that time, the Samurai's had already used a type of derivative in order to secure their incomes in case of a bad harvest.

In the aftermath of the collapse of the Bretton Woods System in the early 1970's it was said to be a shift in the fulcrum of power and profit (Lipuma, Lee 2004), a shift from the production of commodities to circulation of capital. This meant that people wanted to hedge the risk that now was seen upon as an externality of the markets, or a product of it. For example in the oil-market producers did not want to bear the unnecessary risk of dealing indirectly with indebted countries that had a rather unstable economy. So they demanded these derivatives and the possibility to hedge that unnecessary risk.

The speculation in derivatives by people that does not own the underlying nor has any other reason for trading in derivative markets is posing a significant concern to the overall economy. Warren Buffet went as far as to say that derivatives are "weapons of mass destruction" but he emphasized that the problem was not the exchange traded derivatives but the Over-The-Counter (OTC) derivatives. These OTC derivatives are hard to regulate and the transparency of these markets are not nearly close to optimal. The information in this type of derivative market is very little or in many cases not existing. This is because neither private market participants nor the government are legally bound to transpose this information. Instead information is hoarded by each of the market participants (Dodd 2001) and this causes a problem for governmental regulations. Their ability to anticipate and preempt market pressures, major market failures or manipulations becomes limited.

The purpose of this thesis is to discuss and analyze how derivatives affect the underlying market, looking at both the negative and positive effects. The aim will be to try and conclude

if the two types of derivatives can be justified and whether the regulations that exist today, are sufficient.

1.2 Problem topics

I have chosen to split my focus in two parts. In the first part I will take a look at three problems, how systematic risk and volatility are affected by derivatives, how the incentives within derivative markets affect human behavior and finally how the liquidity of the underlying is affected, more specifically if the introduction of derivatives reduces the liquidity premium demanded for less liquid securities (Bhaumik 2008). The following problem topics are defined for this first part:

I.) **How does the introduction of derivatives affect the underlying market's systematic risk and volatility?**

II.) **What incentives lie within derivative markets and does these affect human behavior?**

III.) **Is the liquidity premium that investors demand for less liquid securities affected by the introduction of derivatives trading on the underlying?**

The last part will take a closer look on how derivatives are regulated today. The focus will be on the Basel Accords and the Form 10-Q. Both regulations are important pillars in the effort to regulate financial markets. For this last part I have designed the following problem topic:

IV.) **A closer look at the Basel Accords and the Form 10-Q reporting standards. Linked up with a comparison on what theory and empiric research says about regulating derivatives.**

1.3 The structure of this report

This report is of qualitative nature and will be relying on interpretation of theory and empiric research. The intension is that the report is built up as logically as possible. The report starts with a gathering of theory on the different subjects and then goes on further to look at- and analyzes empiric research. The goal is to be able to understand the theory comprehensively and also be able to comprehend how this theory works in real life. When this is achieved I can go on to try and conclude if some of the regulations today are justified or not.

Chapter 2 gives an introduction to financial derivatives. The goal is to prepare the reader for the theory that is the red line throughout this paper. I will first introduce derivatives and its history and then go on to explain the different concepts regarding derivatives that will be important to understand when reading the paper. In this chapter I will also give the reader an understanding of how complex and comprehensive the market for financial derivatives is today.

Chapter 3 focuses on the effects that derivatives have on the underlying security and human behavior. Problem topic I) is the center of attention in chapters 3.2 and 3.3 where theory is presented on systematic risk and volatility. Based on this the reader should be able to follow the discussion and analyses in the subsequent chapters. Theory around problem topic II) and III) are the focus of chapters 3.4 and 3.5 respectively. Chapter 3.4 also presents theory about the roles of two important participants in derivatives markets, market makers and speculators.

Chapter 4 presents theory regarding problem topic IV). It starts by presenting two types of derivatives, exchange traded- and Over-The-Counter (OTC) derivatives, and the difference between them. This difference is vital to understand when considering different types of regulatory measures. The main focus of chapter 4 is the presentation of some of the more comprehensive regulatory interventions during the last couple of decades. It will focus on the three Basel accords and the Form 10-Q. The understanding of this will be important and when empiric research is considered it will be the ultimate goal to suggest whether or not the regulations are sufficient and well designed.

Chapter 5 will study the relevant empiric research which is related to the four problem topics. Relevant research for systematic risk, volatility and liquidity are presented in tables and discussed further on in their own sub-chapters. Empiric research on individual behavior and regulations of financial markets are also presented and analyzed.

Finally, chapter 7 gives the reader a quick overview of the conclusion on each of the four problem topics that was defined when developing this thesis.

2. INTRODUCTION TO FINANCIAL DERIVATIVES

2.1 Introduction

Derivatives have become important for hedging and speculation within financial markets. A derivative is an instrument whose value is derived from an underlying asset. This can be a stock, a bond or a commodity. The basic use of derivatives has been to reduce risk when owning something that makes futures incomes unpredictable, or not predictable enough. During the latter decades of globalization and securitization there has been a significant increase in the use of derivatives. Derivatives have developed into becoming a popular method for gambling on future movements in markets and prices. This development has played a part in big banking institutions such as Lehman Brothers and Northern Rock tumbling towards the brink of bankruptcy. Lehman Brothers also operated as one of the larger intermediaries for OTC derivatives trading.

2.2 The history of derivatives

The history of the modern derivatives started already in the 1600s. In Holland tulip dealers, grocers and other dealers are trading in options to guarantee prices. Very soon speculators are trading in options and the market rapidly grows. But the markets do not handle the pressure and many individuals fail to honor their commitments and the Dutch economy crashes. In London during the 1700s, options are declared illegal. In the aftermath of the Great depression in 1933, the SEC required that any sale of securities were to be registered with the Securities and Exchange Commission (SEC) in the United States. The following year the Securities and Exchange Act of 1934 came to life and included the reporting of all exchange traded securities as well. Some decades later in the United States, the Investment Act legitimizes options and annual volume were close to 300 000 annually by 1968. In 1973 the Chicago Board of Trade starts trading options with a first-day volume of over 900 contracts (Ware 2005). The search for an understanding of option pricing and the behavior of the market is rapidly growing during the 1900s and mathematics is used for analyses. After a lot of research by many scientists, Black, Scholes and Merton finally solves the problem and then outlines the formula that is today know as the Black-Scholes pricing formula for a call

option. Both Myron Scholes and Robert C. Merton receive Nobel prizes for their work on option pricing.

2.3 The different types of derivatives

It is important to have knowledge about the basic types of derivatives to understand how they might affect volatility, systematic risk, liquidity and even human behavior. It is also important to understand how derivatives "came to life" to be able to understand the resulting- and necessity of regulations.

Derivatives come in different forms, standard contracts and exotic contracts. Standard contracts include buying or selling for future delivery, called forward and futures contracts. It also includes contracts that give the holder a right to buy or sell at a fixed price sometime in the future, called options. Exotic derivatives are all other types of derivatives that exist.

2.3.1 Options

There are two types of options, calls and puts. A call option gives the holder the right to purchase an asset for a specified price called the exercise price, or strike price (Bodie et al. 2008 – page 692). A put option gives the holder the right to sell an asset for a specified exercise price. It is important to understand that the holder has the right, but not the obligation to buy or sell. If the buyer chooses not to exercise he will only have "lost" the price he paid for the option. This is the same for both calls- and puts. There is a difference between American and European options. American options can be exercised at any time before expiration whilst European options can only be exercised at expiration. Because of the possibility to exercise at any time with American options, the American option is usually more valuable. Options are used both for hedging and speculating and quite commonly equity fund managers use options to increase or decrease its exposure to stocks that are held by the fund. Empiric studies have shown that investments managers, through their skills in stock selection and market timing are able to retrieve private information which is used to their advantage (Easley et al (1998)). However, Fong et al. (2005) find no evidence of informed trading in options at an individual stock level.

Option contracts are usually traded on exchanges such as the Chicago Board Options Exchange or the International Securities Exchange. Option contracts traded on exchanges are

standardized in terms of expiration dates, exercise prices and number of shares. The OTC market traded options offer the possibility for tailoring of these standards. Many would see this as a benefit for adjusting to different scenarios etc. The cost of establishing an OTC option contract, however, is higher than for exchange-traded options (Bodie et al. 2008 – page 693), especially if the liquidity of the product is low.

2.3.2 Forwards

A forward contract obligates one party to buy something at a fixed price at a fixed time in the future. This fixed time is called maturity and the counterparty is obliged to sell at the agreed upon price. Forwards are usually used when hedging a price risk for future delivery of something that is affected by the price-movements. Firms and investors often use these contracts to guarantee a price for a future purchase or sale. The price of a forward contract is made at the initial trade date even though delivery is set to a future date. The key difference between forward contracts and options is that the holder of an option is not compelled to buy or sell and if the option is not profitable the holder will choose not to exercise the option. With forward contracts this is not optional.

2.3.3 Futures

Futures contracts are essentially exchange-traded forward contracts. Futures contracts represent a commitment to buy or sell an underlying asset at some future date. These contracts are exchange traded and this means that each exchange has a "clearinghouse" (McDonald 2006 – page 142) who matches buys and sales. Futures contracts on individual stocks in the United States began trading in November 2002 on One Chicago. Earlier, the trading of single stock futures had been stalled by a disagreement among exchanges and by a regulatory turf battle between the Securities and Exchange Commission, and the Commodity Futures Trading Commission (CFTC), which regulates commodity and equity index futures. The disagreement was about how successful and necessary the product would be. There was already a well established market for buying and short selling stocks and it is also possible to create synthetic stock forwards using options (McDonald 2006). Zwick and Collins (2004) say that trading volumes has proved disappointing for some advocates.

Even though there might seem to be several similarities between forwards and futures, there are some essential differences. Futures are settled daily, so-called marking-to-market while

forwards are settled at expiration. This implies that there should be differences in pricing between futures and forwards since the nature of risk is different with future contracts. Futures contracts are structured to minimize the effects of credit risk and the difference in pricing arises from uncertainty about the interest on mark-to-market proceeds. This effect is said to be small on short lived contracts, but can be significant on longer contracts (French 1983). Longer contracts have a certain correlation between the underlying and the interest rate. Futures contracts are liquid in contrast to forwards because of daily settlement. Because futures are exchange traded, these contracts are more standardized whereas forwards can be customized to suit the buyer or the seller (OTC). In regards to the discussion on OTC derivatives and their effect on systemic risk, this last point of difference will be one of the central subjects in later discussion. The use of futures contracts are often inefficient or burdensome for businesses because of daily marking to market. The position does not require any cash transactions on a daily basis but the margin calls from its financial service providers are often not seen as ideal.

2.3.4 Swaps

A swap is a contract calling for an exchange of payments over time. One party makes a payment to the other depending upon whether a price turns out to be greater or less than a reference price that is specified in the swap contract. This means that a swap gives the possibility to hedge a stream of risky payments, contrary to options and forwards that are settled on a single date. Suppose you have an adjustable-rate mortgage with yearly interest payments of $20,000 per year with the current interest rate. If interest rates were to rise significantly your payments would also increase significantly. The solution might be to get a fixed-rate mortgage, but the transaction cost could be substantial and the fixed-rate would be higher than the current rate. The alternative is to find a counterpart and make a swap contract where you would agree to make payments to the counterparty equal to the fixed rate of the $20,000. In exchange the counterparty would pay the bank the adjustable-rate and the only payments you would make are the fixed $20.000 to the counterparty. The counterparty would agree to this because he will make money if the adjustable-rate decreases and has to pay the bank less than the $20,000 per year.

As we have seen, the use of swaps is appropriate when some transactions occur repeatedly. Firms that issue bonds make periodic coupon payments, multinational firms frequently

exchange currencies, firms that buy commodities as production inputs or that sell them make payments or receive income linked to commodity prices on an ongoing basis (McDonald 2006 – page 247).

2.4 Newer derivative inventions and the magnitude of derivatives today

The last couple of decades there have been an increased focus on credit derivatives. A credit derivative is an instrument that is designed to separate and then transfer the credit risk of an underlying loan. This market started in 1993 (Wikipedia) and in just a couple of years there where tenfold of billions in outstanding transactions. Products such as Credit Default Swaps (CDSs) and Collateralized Debt Obligations (CDOs) became more common in the use of hedging against possible defaults. A CDO is actually not necessarily a derivative in its simplest form, but when it is used in conjunction with CDS it becomes a derivative. The portfolio of credit derivatives also includes products such as Portfolio Swaps, Credit Index Products, Repackagings, Default Baskets, Secondary CDO trading, Customized CDO tranches, Default Swaptions and Credit Hybrids. Without digging into the details the point is that the financial engineering has grown tremendously. All of these derivatives products are categorized as exotic derivatives (investingbonds.com).

As mentioned in previous sub-sections, the derivatives industry has grown significantly during both the last century and the last decades. Looking at appendix 1 it is also clear that the development has carried on and in June 2011 the notional amounts of outstanding contracts are slightly above 707,569 billion of US dollars. The overall picture from the report by the Bank for International Settlements "OTC derivatives market activity in the first half of 2011" shows that after an increase of 3% in the second half of 2010, total notional amount outstanding of OTC derivatives rose by 18% in the first half of 2011. Credit default swaps grew by 8% while outstanding equity-linked contracts went up by 21%. Overall gross credit exposure dropped by 15% in the first half of 2011, compared with a 3% decrease in the second half of 2010 (BIS 2011). This development shows that the use of derivatives is growing, and growing rather significantly. As the notional amount of credit default swaps grew, this could be a sign of increased uncertainty about future economic development. The general increase in the use of OTC derivatives possibly shows how markets are becoming more complex and how businesses find themselves exposed to more price risk than ever before. As the reason for increased trading in CDSs can be related to uncertainty about the

overall economy, an increase in the use of interest rate contracts and foreign exchange contracts can be a sign of how businesses expand to international markets because of business opportunities and lower prices in production costs. A booming national economy will make national production more costly as workers will tend to demand higher salaries and this will make it harder to compete with other cheaper economies.

2.5 Summary

This chapter has guided us through the history of derivatives and shown the basic ideas of a financial derivative. The four main categories of derivatives and their history are explained and we also take a look at some of the newer developments in the range of derivatives products. This introduction will have prepared the reader for the next chapter that will show how these different types of derivatives can affect the underlying security.

3. THE EFFECTS OF DERIVATIVES

3.1 Introduction

When a company introduces the possibility to trade in derivatives based on the underlying stock, some of the factors that have been interesting to look at are changes in systematic risk and changes in volatility. Volatility is normally measured by using standard deviation or variance between returns on the underlying and a market index. Higher volatility means that the price can move in a wider area, making the stock relatively more risky. Systematic risk is the element of risk that can't be reduced by diversification. It is a risk that belongs to a whole market or a segment of a market (Investopedia). During this chapter I will guide the reader through these terms and explain what needs to be understood to follow the discussion later on in this paper.

> *"Risk is the central element that influences financial behavior."*
>
> -Robert C.Merton (1999)

There have also been debates on the behavioral side of individuals that operate within financial markets and derivatives. Some arguments claim that these individuals are over-compensated without really bearing any risk. They claim some investors make risky investments on behalf of their employer and because of this they only face risk on the upside. This chapter will have a sub-chapter that goes deeper into the theories regarding behavioral finance and individual behavior towards risk. Ishikawa (2009) explains a part of the problem and claim that bankers were driven by a culture of "bonus by right" and an excessive lifestyle, but they still had legal and moral obligation to their shareholders – to make profits. This emphasizes the complexity of the moral dilemmas and how individuals are confronted with difficult situations within derivative markets.

There are two groups of people that use futures contracts, speculators and hedgers. Hedgers have an interest in the underlying asset. This may be that they own the underlying and want to hedge the price risk. A speculator seeks to make a profit by predicting markets moves. The speculator is seen upon as an externality from the original purpose of futures contracts. The second group is the market maker. A market maker can be compared with a grocer; they buy

at low wholesale prices and sell at the higher retail price. Market-makers are also similar to grocers in the sense that their inventory will reflect market demands. The market-maker falls under the hedger category from above, because he implicitly needs to hedge the risk of holding these products with an opposite position in the underlying. The roles of these two will be discussed and analyzed further in this chapter.

To be able to say whether derivatives are important or not, this chapter also deals with several proxies for measuring the liquidity of an underlying asset. The proxies introduced in this chapter are the liquidity adjusted CAPM, the bid-ask spread and volume. Volume and volatility has an anticipated negative correlation which says that if volumes increases this will in most cases result in lower volatility (Bhaumik 2008).

"Risks of investing in smaller companies include... the potential difficulty of selling these stocks during market downturns (illiquidity)."

—Legal Disclaimer, Investec Asset Management, 2004

3.2 Financial markets

The role of financial markets and the effects that the business cycles can have on day-to-day life is often underappreciated. It is important to understand that in the worst case, a collapse of financial markets can lead to job losses, loss of futures pensions and also failing to make payments on mortgages. This leads us to the most important role of financial markets, risk-sharing. Risk is often a product of instability. This can be natural disasters, floods, earthquakes or tsunamis, for example. And financial markets enable us to share this risk between us. An example would be home-insurance; if my house were to burn to the ground, my insurance would pay for a new house. This insurance is the premium that all of the insurance company's customers have paid, and indirectly all of the customers of the insurance company have paid for my new house. This is the concept of risk-sharing.

3.2.1 Systematic Risk

Systematic risk is measured by the correlation between the return of the individual stock and the return of the market portfolio. The characteristics of systematic risk are its influence by macro-events, events that affect a whole market. The idea behind a well diversified investor is to sustain an element of risk in his portfolio that is equal to the systematic risk. This means

that the portfolio is not affected by firm or sector specific risk. This firm- or sector specific risk is called unsystematic risk or diversifiable risk. Together, these two types of risk are called total risk. Systematic risk is also called the un-diversifiable risk. We can see the relationship between systematic and un-systematic risk in the following diagram:

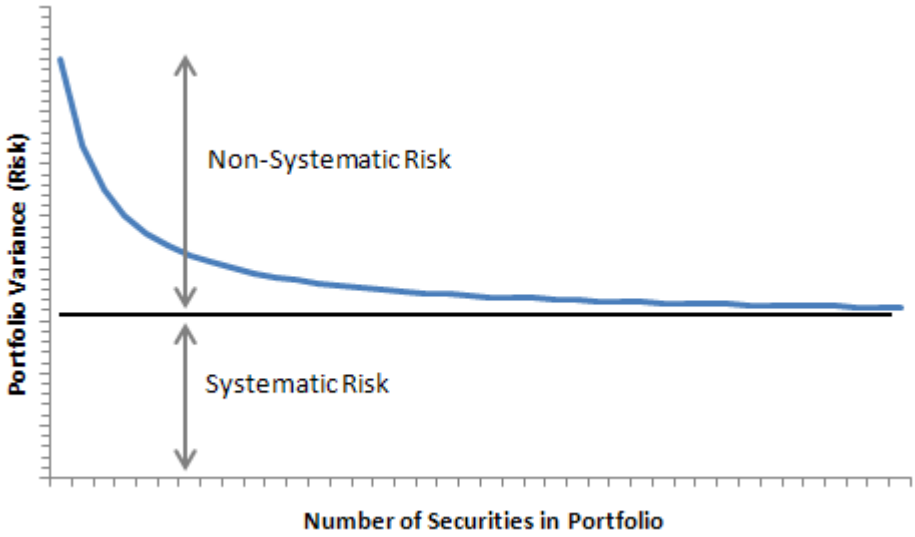

Figure 3.1 – Systematic and Non-Systematic risk versus number of securities in the portfolio. *(Source: ExecutiveFinancialPlanning.com)*

We can see that the systematic risk is constant and the total risk of the portfolio asymptotically closes in on systematic risk as the number of securities in the portfolio increases. This is because the investor will eventually own all shares, i.e. the market portfolio. In general, a well-diversified investor would want to obtain a total risk in his portfolio as close to the systematic risk as possible. Often the investor finds it advantageous to include derivatives in his portfolio due to not necessarily having to own the underlying and if the total risk has changed and especially the systematic risk after the inclusion of derivatives, then the investor would find it disadvantageous. Therefore it is ideal that the systematic risk before- and after the introduction of derivatives trading are constant.

The model of total risk is:

Total risk = Systematic risk + Unsystematic risk

or expressed in mathematical terms,

$$\sigma^2_i = \beta^2_i \sigma^2_M + \sigma^2 (e_i)$$

Equation 3.1 – Model of total risk (Source: Bodie et al. 2008)

The systematic risk of security i is $\beta^2_i \sigma^2_M$ where β^2_i is the beta of the security i and σ^2_M is the variance of the market. When testing if introduction of derivatives have any influence on systemic risk, the methodology is to test the beta value, before and after the introduction. There has been quite a widespread focus during later years on the time varying feature of the beta and how many researchers have failed to account for this feature via their analyses of the market and the use of a single index model (Mazouz & Bowe (2004)). This time varying feature can be caused by changes in the micro- or macroeconomic conditions. In turn, this can lead to an over-estimation of the firm specific risk (see Black (1976) or Christie (1982 for an outline). This also implies to some studies made on price-volatility. A specific case of how this mispricing takes effect is how the traditional OLS regression gives high average returns but low estimated betas for value stocks, that is stocks with decreasing betas.. In the CAPM framework this could result in higher levels of unsystematic risk, thus high risk levels are accompanied with high returns. Models that takes the time varying feature in the beta into account (see Adrian & Franzoni (2008), Mazouz & Bowe (2004) or Hassan & Khasawneh (2009)) will have higher estimates of the beta because their estimates will be influenced by the historic higher levels in the beta. This effect is of course the opposite for growth stocks; the traditional OLS will give them higher values than adjusted models will give. In this case the result might be a mispricing of the firm-specific risk. This feature of the beta will be important to consider when empiric research on systematic risk is analyzed.

The rapid rise in the numbers of outstanding securities has grown to be a big concern for regulators in regards to whether it increases the systematic risk of financial markets. The worry is the linkage between increased systematic risk and global financial chaos. Ultimately, systematic is understood through the concept of systemic risk, systemic risk is “the risk that a disruption (at a firm, in a market segment, to a settlement system etc.) causes widespread difficulties at other firms, in other market segments or in the financial system as a whole” (BIS 1992 - Page 61). We consider derivatives to affect (increase) systematic risk because OTC-derivatives make the firms’ true financial conditions less transparent. OTC-derivatives also pose the threat that the complexity and level of sophistication behind the products makes

them more difficult to understand and also easier to calculate wrongly, in regards of their true nature of risk. These assumptions will be based on more of the enhanced engineering in credit-derivatives during the last decade. But it is important to understand that this is not necessarily the case when it comes to plain equity-derivatives and properly exchange traded derivatives.

3.2.2 Volatility

Derivatives such as futures or options provide important possibilities for market participants. They can use derivatives for price discovery, portfolio diversification and also to hedge against any adverse pricing movements. This shows that the introduction of derivatives has a significant influence on the corresponding spot markets. That is the main reason why the debate on the impact of derivatives trading on spot market volatility has become increasingly important.

Srinivasan and Bhat (2008) say the theory in regards of the impact on volatility, points in two directions. One theory claim that the introduction of futures market increases volatility due to the benefits of leveraging and the low transaction costs, and these benefits will attract larger groups of uninformed investors. The other theory is based on what they call “noise trading”. The concept is that the opportunities that lie within future markets will shift investors from spot market trading to the futures market. These speculators, who obviously care about minimizing transaction cost, will find it advantageous to be able to trade without necessarily owning the underlying asset and also reap the benefits of leveraging. This is what Srinivasan and Bhat (2008) call noise trading and since this trading is shifted towards derivatives markets, spot market will be less volatile and free of uninformed speculators.

There are two main measures of volatility, historic volatility and implied volatility. Historic volatility, also known as statistical volatility, is calculated by observing previous data. This is commonly done by using the standard deviation of the stock which is calculated by determining the average deviation in the price of a stock at time t from its average. Implied volatility takes into account any expectations about future fluctuations in the price. Implied volatility is deducted from options prices on that same underlying, both from puts and calls. This is because expectations of future fluctuations are reflected in the prices of these options since they are for delivery sometime in the future. The intuition is that if expectations of the

stock's fluctuations are high, the probability for the option ending "in the money" is greater, thus the option is priced higher. The Black & Scholes formula is then used to calculate the investor's expectations of future volatility levels.

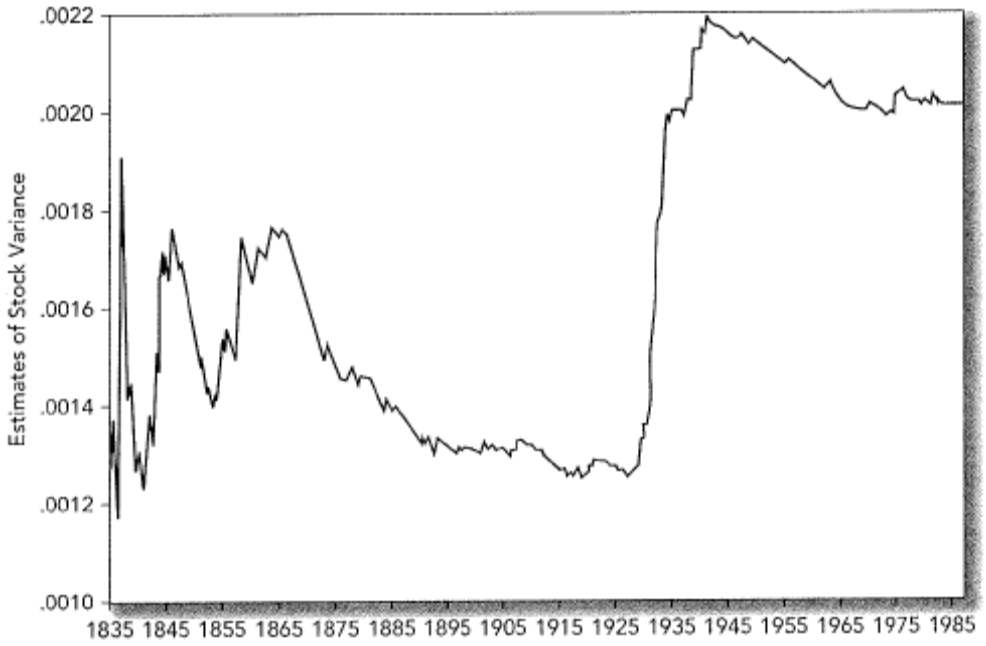

Figure 3.2 – Estimates of the monthly stock return variance*. (Source: Bodie et al. 2008)*

As the rate of arrival of new information must be seen as time varying, the investor's assessment of the intrinsic value must also be time varying. This implies that we should expect the variance of the rates of return on stocks to be time varying. Because of this the mean, variance and covariance must be considered conditional on currently available information. This is not the case with the unconditional case because the unconditional only takes into account the mean, variance and covariance in the sample period and assumes that this is constant over time. When studying the effects on volatility when introducing derivatives it is therefore commonly used the generalized autoregressive conditional heteroscedasticity (GARCH) model pioneered by Engle (1982). In contrast to implied volatility, this model incorporates the flexibility in the specification of how volatility changes over time in a better manner. The GARCH model takes for granted that the market volatility changes relatively smoothly each period in response to new observations on market returns. The updated GARH estimate of market-return variance depends on both the previous estimates (historic available information) and the most recent squared residual return on the market (all future available information) (Bodie et al. 2008). However, if GARCH estimations

are utilized, this sets demands on quite substantial amounts of data. Engle and Mezrich suggest up to eight years of daily data.

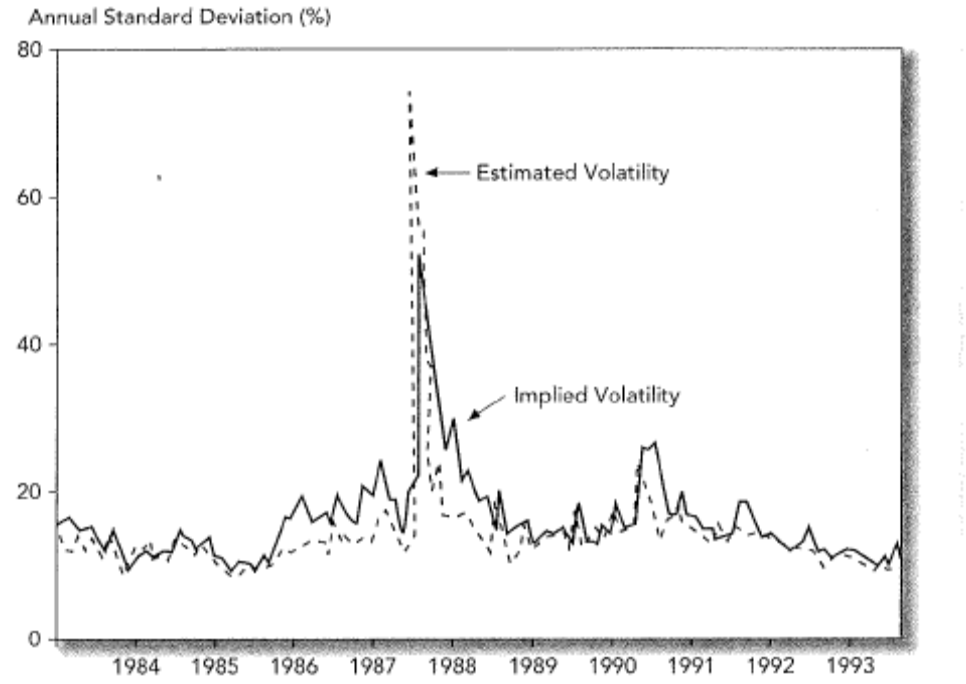

Figure 3.3 – Implied versus estimated volatility. *Implied volatility is derived from options on the S&P 100 and estimated volatility is derived from an ARCH model. (Source: Bodie et al. 2008)*

3.3 Individual behavior

Our behavior is significantly related to individual attitude against risk. According to economic theory, we have three ways to adapt to risk (Boehren, Michalsen 2006). The first way is to be risk-seeking; this means that the individual will not necessarily demand higher expected returns to take on additional risk. The second adaption is to be risk-neutral and this means that the individual is only concerned about expected returns. If a risk-neutral individual is set to choose between two alternatives, the individual will always choose the alternative that gives the highest expected return, without considering risk. If this individual is put to choose between two choices with equal expected returns, but where the one alternative is more risky, a risk-neutral individual will be indifferent between the two alternatives. The third- and last way to adapt to risk is being risk-averse, this means that the individual will only take on extra risk if he/she is sufficiently compensated in form of increased expected returns. This last one is probably the most common assumption in economics; for example, investors are very focused on being properly compensated for taking on additional risk via measuring expected

returns over risk via proxies such as the Sharpe measure, the Treynor measure or the Jensen measure. All these proxies give the investor an idea if they are properly compensated for taking on additional risk.

3.3.1 Rational behavior

To be able to explain the behavior of an individual the most common approach is to look at norms and further impose them in a more complex preference structure. Based on this, it is expected that the rational individual will choose the alternative that in the best way satisfies the preferences that the individual has in respect to the possible results it is possible to achieve (Eide 1994). If norms do not have any effect on which behavior the individual adapts to, this is seen upon as norm-free rational behavior. But this is a theoretical extreme. If the preferences and the alternatives are stabile, changes in behavior must be caused by changes in the surroundings. The question if changes in laws and regulations actually affect individual norms, is commonly left to other academic disciplines to answer (Eide 1994). In the other extreme we are talking about a situation where norms are so decisive to an individual's behavior that analyses based exclusively on rational behavior are irrelevant and of little interest. In social economics the most common is to study changes in the consumer's surroundings. Often it is income and price that are under study.

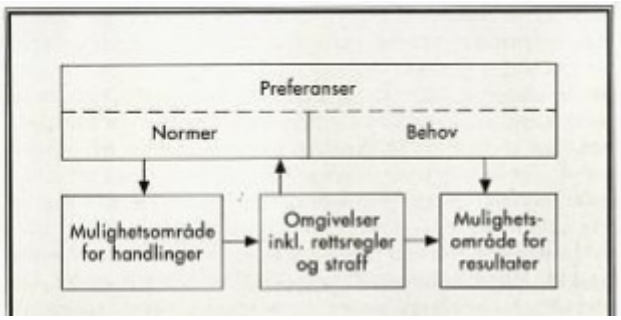

Figure 3.4 – Illustration of rational behavior with norms. *(Source: Eide 1994)*

From figure 3.4 we can see that an individual does not want to perform an action that crosses the separate norms to that individual, but since an individual can have so many norms and physical needs, it will sometimes be justified to set aside certain norms. In some situations we can actually defend breaking the law because we have so many physical needs that have to be covered. A common term for these two areas of focus, norms and needs, are preferences (Eide 1994). Norms that are not internalized and is in the surroundings of the individual,

makes its influence through the effect on the result of the individual's actions. If norms, in addition to being internalized, gets socially accepted – meaning that they are conceived by the individual as correct, the pattern of actions is affected (Eide 1994 – page 30). But no matter if norms are social accepted, feelings of guilt, shame and disgrace will always inhibit the action that is against the law (Eide 1994 – page 30).

The rational human being who is conceived to be identical to a fictive average individual will react to increased punishment for an action by becoming more law-abiding. According to economic theory we can therefore consider the threat of punishment as a pricing mechanism. Illegal actions are replaced with legal actions when threats of punishment increase; this means that illegal actions gets relatively less profitable (Eide 1994 – page 31). There are many opinions about how individuals are capable of perceiving everything objectively and that the individual norms are constant and independent of changes in surroundings. In social economics it is common to assume that these are constant and especially in a macro perspective it is a given condition because the theory indicates that individual differences will even out in the long run (Eide 1994 – page 39).

3.3.2 Behavioral finance

Even if information processing were perfect, many studies conclude that individuals would tend to make less-than fully rational decisions using that information. These behavioral biases largely affect how investors frame question of risk versus return, and therefore make risk-return trade offs (Bodie et al 2008 – page 398). Decisions seem to be affected by how choices are framed. For example, an individual may reject a bet when it is posed in terms of the risk surrounding potential losses. In other words, individuals may act risk-averse in terms of gain but risk-seeking in terms of losses (see figure below). But in many cases, the choice of how to frame a risky choice can be arbitrary. This scope of behavioral finance is referred to as "framing" (Bodie et al 2008 – page 398). The figure under and the concept of prospect theory gives us a good understanding of this:

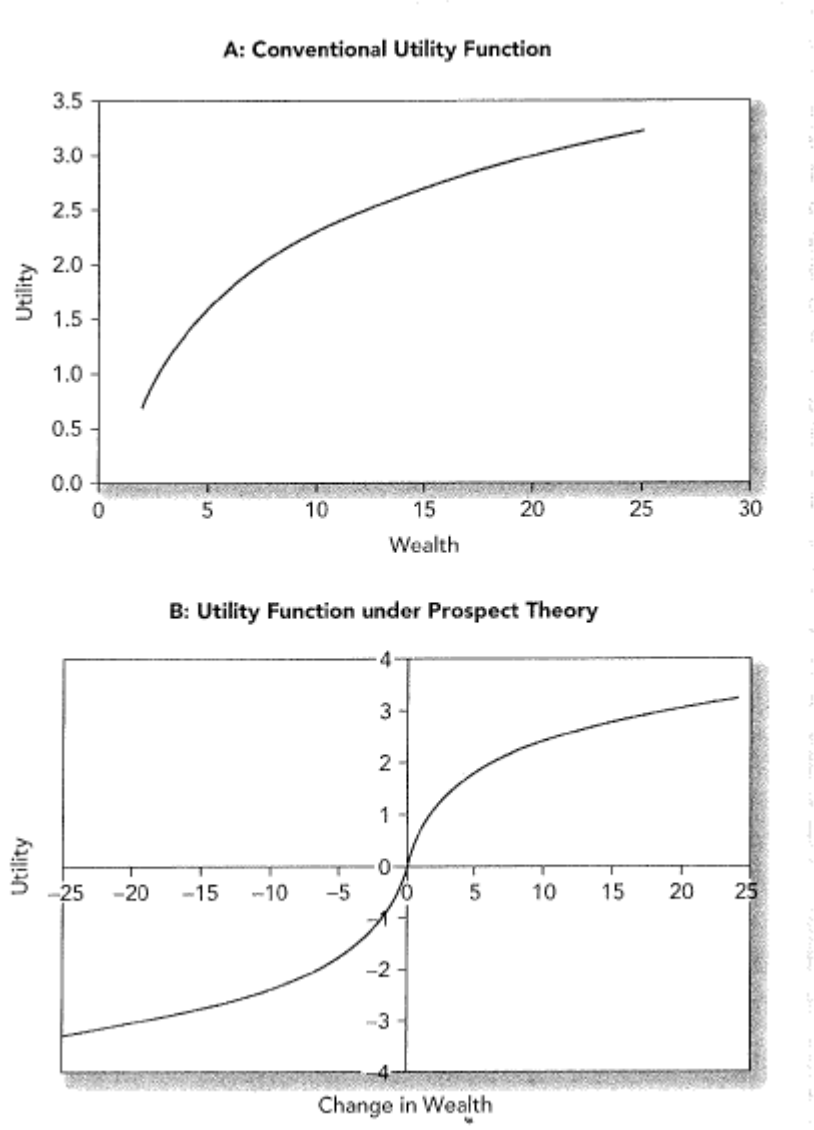

Figure 3.5 – Prospect theory. *Conventional utility (Panel A) is defined in terms of wealth and is concave i.e. risk aversion. Utility Function under Prospect Theory (Panel B) shows loss aversion and is defined in terms of losses relative to current health. Convex to the left i.e. risk-seeking in terms of losses.(Source Bodie et al. 2008).*

Panel A illustrates the conventional description of a risk-averse investor where higher wealth means higher utility, but a diminishing marginal utility as wealth grows. This is where risk-aversion is from. A gain of 100$ increases utility by less than a loss of 100$ reduces it, therefore we chose the safe project if the risky one does not offer a satisfying risk premium. Panel B shows a competing description of preferences characterized by loss-aversion. Utility depends not on the net level of wealth as in panel A, but on changes in wealth from current levels. We see that to the left of zero, the graph is convex rather than concave. This implies that the investor become less risk averse as wealth increase and again, this means that investors will become risk seeking rather than risk averse when it comes to losses.

The concept of "mental accounting" (Bodie et al 2008) is a term that is important to understand when it comes to considering the risk surrounding derivatives. It is a form of framing as described in the previous section. It is a situation where people segregate different decisions, for example, an investor may take a lot of risk with investment account, but establish a very careful and conservative position with another account that is dedicated to someone else who he has a higher degree of moral obligation towards. As Ishikawa (2009) called it "bonus by right", hence giving the highest paying client the most consideration. Rationally, it might be better to view both accounts as part of the investor's overall portfolio with the risk-return profiles of each integrated into a unified framework. Statman (1997) argues that mental accounting is consistent with some investor's irrational preferences for stocks with high cash dividends and a tendency to ride loosing stock positions for too long. They feel free to spend dividend income, but would not dig into capital by selling a few shares of another stock with the same total rate of return. In fact, investors are more likely to sell stocks with gains than those with losses, precisely contrary to a tax-minimizing strategy (Odean 1998). Mental accounting effects can also help us explain the momentum in stock price changes. The concept is about being more willing to accept new bets if they currently are ahead. People tend to be marginally less concerned with another dollar spent when they have relatively higher winnings (not wealth). Of course this is not true for everyone. In stock markets and after an increase in your stocks prices, individuals may view investments as largely funded out of a "capital gains account", become more tolerant of risk, discount future cash flows at a lower rate, and thus push prices up.

3.3.3 Incentives

Working within the financial derivative markets is in many cases hugely sought after. As most people probably have heard of, the economic incentives within finance are in general quite lucrative. Financial markets are known for high bonuses and salaries that seem to be above average, at least in booming economies. What is probably not well known to people is the lifestyle amongst investment bankers. We have two different types of bankers, investment bankers and commercial bankers. Commercial bankers do the business that we deal with every day – provide bank accounts and make loans. Most commercial bankers earn a healthy but modest salary. Investment bankers on the other hand, are in a much more lucrative game, brokering deals for companies in corporate finance, and providing research and trading capabilities for investors in "sales and trading". Both businesses deal with billion-dollar plus

deals and, accordingly, the fees that these investment banks reap are enormous (Ishikawa 2009). Ishikawa is behind the book "How I caused the credit crunch" – An insider's story of the financial meltdown. He takes us through seven years of his career working within companies as Goldman Sachs, Morgan Stanley and ABN MRO, where he structured, syndicated and sold credit derivatives, CDO and securitization (including subprime) products to investors globally. In 2008, he was made redundant by Morgan Stanley and throughout his book he takes us through stories of drugs, prostitution and alcohol abuse. The example is introduced to show that the concepts of framing and rational behavior is something that in many cases is key to understanding why investment bankers behave as they do.

3.4 The importance of derivatives

3.4.1 Market-makers

It is important to understand this role in the financial system. The bid-ask price shows that the market-maker will always demand compensation for having a product in its inventory. The bid price is the price at which the market-maker buys the product on the wholesale market, and the ask price is what the market-maker is willing to sell the product for. Market-makers will always attempt to hedge their position because a market-maker will always have an arbitrary position with uncontrolled risk. The key idea in derivatives is that this hedged position should always be equal to the risk-free rate, because the market-maker has money tied up with no risk and that should equal the risk-free rate of return (McDonald 2006). This method of hedging is called delta-hedging and was also exploited by Black and Scholes when they derived the option pricing formula. The idea is based on finding the option delta and to take an offsetting position in shares of the same underlying as he is selling. The formula takes into account the dividends that the market-makers expects the stock to pay. But in the case where a dividend is significant different from what is expected, the outcome is that the delta-hedger can make or lose significant amounts of money, hence the strategy is not completely risk-free. The resemblance to insurance companies is clear, in case of an extreme event, delta-hedging will fail and big capital pay-outs are unavoidable.

So, the role of the market-maker can be seen as a necessary condition for derivative markets, but we can see how the spiral runs because the market-maker needs to hedge. Ultimately there has to be a counterparty that is willing to- and will have to take on a loss to absorb the risk.

3.4.2 Speculators

We know that financial derivatives are widely used for speculation today. The use of strategies such as Straddles, Collars, Butterfly Spreads, Ratio Spreads, Bull and Bear Spreads (see glossary of concepts for a simply introduction to these strategies) are used throughout the world without any other incentive than to bet on future movements in prices. The speculator may speculate in the spot, forward, or options markets. Speculation in the spot market is a bet that the speculator believes the foreign currency will appreciate in value. On the other hand, speculation in the forward market is a bet that the spot rate moves in either direction at some future date and differs from today's forward price for that same date (Eiteman et al 2007). However, speculation in the option markets might seem less risky. The thing is that the owner of an option has the right but not the obligation to exercise the option. If the option is "out of the money" (see glossary) the owner will simply choose to not exercise, leaving him with the initial price for the option as loss. On the up-side, the potential for profits are unlimited.

3.4.3 Liquidity

The term liquidity is a somewhat widely used concept. But what we know is that liquidity is the ability to quickly sell or buy an asset without affecting the price significantly. The asset is liquid if it can be exchanged for cash instantly without having to give a discount in terms of price. Multinational enterprises are able to improve its market liquidity by raising funds from both domestic and foreign markets. It can issue and sell securities to both domestic and international investors. When a firm issues securities for international investors, they reduce their levels of portfolio risk because domestic securities markets are imperfectly correlated, in most cases. This is the concept of diversification and international portfolios often have higher expected rates of return (Eiteman 2007). In regards to derivatives this is one of the reasons why multinational enterprises hold quite large amounts of financial derivatives.

Theory argues that informed investors migrate from spot markets to derivatives markets because of the superiority of speculation, which is the possibility for leveraging, avoiding short sales restrictions and tailoring of products. This reduction of informed investors in the underlying markets reduces the possibilities for adverse selection problems to the market maker and thereby reducing the spread which improves liquidity. Kumar et al (1998) argues as investors shift from spot to derivatives markets, this increases the marginal benefit of becoming informed. This will eventually lead to a bigger incentive for uninformed traders to

search for information and becoming informed. The result is an increase in public information which reduces information asymmetries, lowers the spread and improves the efficiency and liquidity of the underlying market.

Theory also depicts effects such as the "clientele effect". It stems from the theory that the reduction in the rate of return due to trading costs is lower the longer the security is held. This means that in equilibrium, investors with long holding periods will on average hold more of the illiquid securities. The investors with shorter holding periods will often prefer more liquid securities. "The result is that the liquidity premium should increase with the bid-ask spread at a decreasing rate" (Bodie et al 2008 – page 320). Figure 3.6 confirms this prediction:

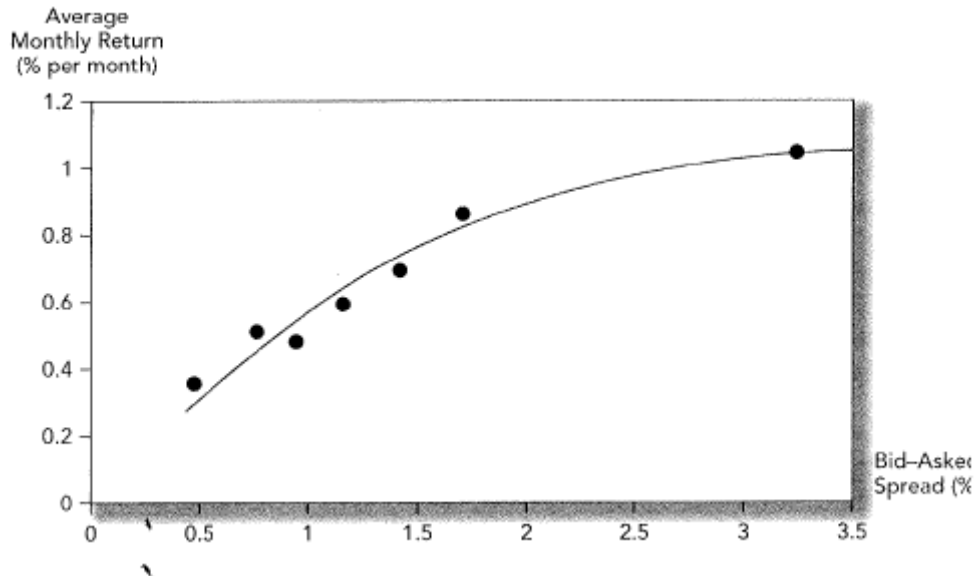

Figure 3.6 – The relationship between illiquidity and average returns*. (Source: Bodie et al. 2008).*

Liquidity is unfortunately not a directly observable variable, so there is no joint theoretical understanding for measuring liquidity, however, the three most recognized proxies for measuring liquidity is the bid-ask spread, volume or transactions and finally the weighted spread data approach..However, data for a time series based on market microstructure data is usually not available. But since 2000 the SEC has required US market centers to report summary statistics of their effective costs based on the orders they actually receive and execute (University of Cincinnati). The bid-ask spread measures the cost of selling small number of shares, but it does not necessarily measure the cost of selling many shares. Critics (for example, see Goyenko et al 2008) have been asking whether the proxies actually measure

what they intend, the discussion is made because of the limited availability for actual trading costs. They end up finding a close association between many of the proxies and actual trading costs. Goyenko et al. (2008) examine three dominating measures of liquidity, the Pastor-Stambaugh Gamma, the Amivest "Liquidity" ratio and the Amihud measure:

$$ILLIQ_t^i = \frac{1}{Days_t^i} \sum_{d=1}^{Days_t^i} \frac{|R_{td}^i|}{V_{td}^i}$$

Equation 3.2 – The Amihud measure of liquidity (Soruce: Chan et al. 2005)

Where R^i_{td} and V^i_{td} are, respectively, the return and volume (in millions) on day d in month t, and $Days^i_t$ is the number of valid observation days in month t for stock i. The idea is that a stock is illiquid, meaning it has a higher value of $ILLIQ^i_t$, if the price of the stock moves a lot in response to little volume, both selling and buying volumes. This model utilizes the volume as a measure of illiquidity and is recognized as one of the most common measures for liquidity in regards to volume as the driver. The weighted spread data models captures liquidity based on weighted spread data against the limit order book. This model accounts for the fact that liquidity cost increase with order size and calculates the cost of illiquidity as the deviation from the assets fair value. Fair value is of course the mid-point of the bid-ask spread. This measure is supposedly intuitive and allows comparison across markets. The improved access to limit order book data has been increasingly useful in micro research like this. The model takes care of the problem with bid-ask measuring and how it does not adjust for the cost of selling large numbers of shares etc.

The liquidity adjusted CAPM is a form of the original Capital Asset Pricing Model which takes into account three different liquidity risks. Bodie et al (2008) defines these as three liquidity-related betas. This model is a comprehensive approach to explain how asset prices are affected by liquidity risk and the commonality in returns. The first beta measures the sensitivity or variance between the security's illiquidity to the market liquidity. The idea is that the investor demands additional compensation for holding a security which becomes illiquid when the market in general becomes illiquid. The positive relationship between these two factors has been studied for several years and the potential empirical significance between these are proven in papers such as Chordia et al. (2000). The second liquidity-related beta measures the sensitivity of the security's return to market illiquidity. The relationship is

negatively correlated since investors are willing to accept lower return on securities that will provide higher returns when market illiquidity is greater. The third liquidity-related beta measures the sensitivity of the security illiquidity to the market return. Also this relationship is assumed to be negatively correlated since the investor will accept a lower average return on securities that can be sold more easily (are more liquid and have less illiquidity costs) when the market declines and the investor is poorer. Using these betas with the ordinary CAPM gives us the following expression for the liquidity adjusted CAPM:

$$\mathbf{E\ (R_i) = kE(C_i) + \lambda\ (\beta + \beta_{L1} - \beta_{L2} - \beta_{L3})}$$

Equation 3.3 – The liquidity adjusted CAPM (Source: Bodie et al. 2008)

Where $E(C_i)$ is the expected cost of illiquidity and k is the adjustment for average holding period over all securities. Λ is the market risk premium net of average market liquidity and β is the measure of systematic market risk.

3.5 Summary

There does not seem to be any common accepted theory on whether systematic risk increases or decreases when the possibility for trading derivatives on the underlying asset. But there seem to be a common understanding (Dodd 2001) that the systemic risk increases as leverage levels increases. Derivatives transactions allow investors to take on large positions in the market while only committing to a small amount of collateral. When taking on these greater risks, the likelihood that the investor makes or loses large amounts of money. The downside might cause bankruptcy and further on affect other stakeholders, this is the concept of systemic risk and is an economy wide problem (Dodd 2001) that is made worse by leverage and derivatives. If this development continues, the a priori thinking must be that in the long run it affects systematic risk. This will be further analyzed and discussed in the subsequent chapters.

There seems to be a common perception that the financial sector is overly compensated. Of course, this perception is driven by what the media is focusing on. Tabloids are often relatively one-sided in what they are presenting and in the financial turmoil after an economic crisis, it is often very important to find someone to blame. The problem seems to be that not everyone understands why and what these investment bankers are doing and whether their

behavior can be considered rational. Instead, they solely condemn the high levels of risk and compensation. This chapter shows that rational behavior is not always “the common good” nor in every case the most legitimate choice.

In this chapter we have also seen how both market makers and speculators contribute to financial markets. The ultimate need for market makers to hedge their position is recognized and seems well founded. The theory is presented on how one can measure the levels of liquidity and illiquidity in financial markets. The effects from derivatives on volatility have also shown us a concern that must be addressed. In the next chapter, all of these concerns will be linked up with how derivatives are regulated today.

4. THE REGULATION OF DERIVATIVES

4.1 Introduction

There are two types of derivatives, exchange traded derivatives and Over-the-counter derivatives. OTC derivatives are not directly regulated while the exchange traded derivatives are. In 1998, the CFTC in the United States suggested to impose regulations on OTC traded derivatives. Brooksley E. Born was the chairman for the CFTC during this period and were behind these attempts to regulate OTC derivatives. She met too much resistance from the Clinton administration and instead in December 2000, congress passed the "Commodity Futures Modernization Act", it practically banned the regulations of OTC derivatives.

There have been some successful attempts to regulate financial markets during the last decades as well. The Basel regulations represent one of these. The Basel I regulations wanted to minimize credit-risk by imposing minimum capital requirements for financial institutions. The Basel II regulations wanted to integrate the Basel I capital standards with the national regulations and try to ensure institution liquidity. In 2009 the Basel III was published, its intentions were to require banks to maintain proper leverage ratios and meet some capital requirements.

The Form 10-Q is a comprehensive report of a company's performance which is to be submitted quarterly to the Securities and Exchange Commission. In this submission there are areas that involve the reporting of derivatives.

4.2 Two types of derivatives

Much of the commercial trading with derivatives occurs in the OTC market. In contrast of exchange traded derivatives, these derivatives are often traded with banks or other types of dealers. This makes them difficult to regulate and to obtain statistics for. The reason that securities are traded over-the-counter is usually because small companies find it hard to meet the requirements that is demanded to enlist on an exchange. A bond, for example, is not traded on a formal exchange and is therefore also considered as an OTC security. There are different types of markets that derivatives operate in and according to Bodie et al (2008) there are four types of these financial markets: direct search markets, brokered markets, dealer

markets, and auction markets. The auction markets are the most integrated market and this is where exchange traded derivatives are traded. The OTC derivatives are traded in the second most integrated market which is the dealer markets.

4.2.2 Exchange traded derivatives

The standardization in exchange traded markets, or auction markets, mean that all market participants trade in a limited and uniform set of securities (Bodie et al. 2008). Of course, this increases the volumes in the particular trading of one derivative and this lowers trading costs, thus giving us a more competitive market. The two main advantages that exchanges gives us are therefore, ease of trading and a liquid secondary marketplace where buyers and sellers meet, quickly and cheaply. Another important feature of exchange traded derivatives is that the credit risk is minimized. The exchange minimizes the risk by requiring collateral of both participants in a transaction; hence the exchange becomes the counterparty in all transactions. This shows the benefit of central clearing, a matter I will be discussing in subsequent chapters.

The market for exchange traded derivatives is not as large as the OTC market. The Bank for International Settlements (BIS) does semi-annual reports on the sizes of both exchange traded derivatives and OTC derivatives. As per the end of 2011 the outstanding notional amount of OTC derivatives was 647,762 billion dollars and the outstanding notional amount of exchange traded derivatives was 22,930 billion dollars. That is quite a contrastive and worrying difference from a regulatory perspective.

4.2.3 Over-The-Counter derivatives

In 1971 the National Association of Securities Dealers Automatic Quotations System, or Nasdaq, was developed to link brokers and dealers electronically through computers. Even though Nasdaq operates within dealer markets, Nasdaq stock are generally not classified as over-the-counter, this is because the Nasdaq is considered a stock exchange. Dealers are specialists in different types of assets. They purchase assets on their own account, and later sell them for a profit. This is where the sources for market makers and bid-ask spreads are. The bid-ask spread simply represents the profit that the market maker, or dealer, demands for holding the asset in its inventory.

The early OTC markets were relatively illiquid, but the market has grown to such dimension since the 1970s, that the liquidity in general is relatively good. This development has caused a problem with counterparty risk and the buyer has to assess the counterparty's ability to fulfill the contract in order to deal with this risk. However, the problem is that this assessment is in many cases difficult due to the low levels of available information and the opaque nature of OTC derivatives. The public information on OTC markets is relatively small or non-existent. The reason is that neither private market participants nor government regulators are legally committed to transpose this information. The prices and other trading information are not made freely available as for exchange traded markets. The result is that information gets hoarded (Dodd 2001) and this causes a problem for government regulators. Their ability to anticipate and preempt market pressures, major market failures or manipulations, becomes limited.

The benefits of trading over-the-counter are the possibility to tailor the products. For example, with option contracts one can tailor the exercise prices, maturity date, and numbers of shares. On the downside, the cost of establishing over-the-counter contracts can be higher than for exchange traded contracts.

A danger involved in the use of OTC derivatives to avoid or out-flank financial market regulations designed to improve the over-all stability of financial markets (Dodd 2001). In the financial crisis of the latter years of the 1990s in Mexico and East Asia, this was exactly the case, financial institutions used derivatives called "total rate of return swaps" to avoid financial regulations limiting these institutions exposure to foreign exchange risk.

4.3 Banking regulations

Bank failures were prominent during the 1980s, a time which has been referred to as the "savings and loan crisis" (Investopedia 2012). The lending from banks all over the world had significantly increased along with the countries' external indebtedness, the latter at an extensive rate. The result was that the potential for bankruptcy of major international banks grew because of low levels of equity-holdings by the banks. In order to prevent this risk, the Basel Committee on Banking Supervision met in Basel in Switzerland in December 1987. The Committee consisted of central banks and supervisory authorities of 10 countries.

4.3.1 Basel I

In 1988, the Basel Committee on Banking Supervision came to agreement on the Basel I Capital Accord. Before this agreement there had not been any single definition of bank capital and the Basel I was the advocate for setting this standard.

The standard set capital is based on two tiers:

1. Tier 1 – Core Capital: This tier includes stock issues (or shareholders equity) and declared reserves, such as loan loss reserves set aside to cushion future losses or for smoothing out income variations.
2. Tier 2 – Supplementary Capital: Tier 2 includes all other possible sources of capital. This might be gains on investment assets, long-term debt with maturity greater than 5 years and also hidden reserves. Hidden reserves as in excess allowance for loans etc. Short-term (shorter maturity than 5 years) unsecured debt- or debt without guarantees, are not included in the definition of supplementary- or core capital.

The main target was to set a capital-ratio to be able to manage risk, so the credit risk was defined as the risk weighted asset (RWA) of the bank, this relates to the bank's assets, weighted in relation to their relative credit risk. The target is that the total capital should be higher or equal to 8 percent of the bank's credit risk (RWA). The Basel I agreements also identify three types of credit risks; *The on-balance sheet risk*, *the off-balance sheet trading risk* which covers interest rates, foreign exchange, equity derivatives and commodities, and *non-trading risk* which covers general guarantees, such as forward purchase of assets or transaction-related debt assets.

The on-balance sheet risk, defines four risk categories weighted according to relative risk (Investopedia 2012):

Risk weight: 0%	**Asset Class**: Cash and gold held in the bank. Obligation on OECD governments and U.S. Treasuries.
Risk weight: 20%	**Asset Class**: Claims on OECD banks, securities issued by U.S. government agencies and claims on municipalities.
Risk weight: 50 %	**Asset Class**: Residential mortgages.

Risk weight:100% **Asset Class**: All other claims such as corporate bonds, less-developed countries' debt, claims on non-OECD banks, equities, real estate, plant and equipment.

The class of off-balance sheet trading risk is where this accord comments on derivatives. It set guidelines for risk-weighted capital adequacy in regards to the banking book. The risk weights are decided from both the reference asset and the protection seller. If the position is unprotected or partly unprotected, that part should apply a risk weight according to the reference asset. If the protection is sold, the risk weight is equal to specific risk of the single entity which the protection is exposed to. If the derivative purchaser has bought protection via products that relates to more than one entity (see First-to-Default-Baskets (FTDB) for example) the purchasing entity can incorporate risk weights that are either equal to the *one* entity this protection is bought against, or *proportionally* according to the proportions of each entity in the basket. As we can see, different RWA approaches are used in accordance to whether the instrument covers only a default in the reference obligation or if it is also affected by changes in its market value. Positions can be netted if the positions are equal and opposite in all respects (Bank of Malaysia).

The Basel I wanted to assess the link between capital and credit risk. The link is important especially when a debtholder can't fulfill its obligation (this is where CDOs had its origin). It probably had some shortfalls, but the Basel I was important because it started a trend toward increasing research on risk. I will come back to some of the addressed shortcomings and discussions around them, but it is important to be aware of that the Basel I is considered a milestone in the quest for managing risk and capital holdings.

The Basel committee continues in educating the finance- and banking sector about capital requirements and the different aspects of risks they encounter. In 1996 they published a document which is commonly referred to as the Market Risk Amendment. The publication describes two alternative approaches for measuring market risk, a standardized method developed by the Basel Committee and another approach which uses the concept of internal value at risk (VaR). The VaR-approach can only be used by the largest banks that satisfy qualitative and quantitative standards imposed by the Basel agreement. This was a

supplement to the Basel I accord of 1988. It was aimed at interest related instruments and equities which apply to the current market value of the trading book, where the trading book is seen as the company's short term positions in financial instruments that is intended to benefit from short term fluctuations in prices or interest rates. Amongst these instruments are forward rate agreements (FRAs), other forwards, bond futures, interest rate and cross-currency swaps and forward foreign exchange positions, all instruments are sensitive towards interest rate fluctuations .

In 2000, the Basel Committee issued the document "Principles for the Management of Credit Risk". The purpose was to "encourage banking supervisors globally to promote sound practices for managing credit risk" (Basel Committee on Banking Supervision 2000 – page 1). The document specifically addressed four areas: (i) establishing an appropriate credit risk environment; (ii) operating under a sound credit-granting process; (iii) maintaining an appropriate credit administration, measurement and monitoring process; and (iv)ensuring adequate controls over credit risk.

The Basel Committee's next pillar in banking regulations was to come in 2004, frequently known as the Basel II accord. This will be the focus of the next sub-chapter.

4.3.2 Basel II

In 2004, the Basel Committee publishes a new accord called Basel II: International Convergence of Capital Measurements and Capital Standards: a Revised Framework. The target was to develop a framework that would further strengthen the soundness and stability of the international banking system while maintaining sufficient consistency so that capital adequacy will not be a significant source of competitive inequality among internationally active banks (Basel Committee on Banking Supervision).

The document is based on three pillars which are: (i) minimum capital requirements; (ii) supervisory review process; (iii) market discipline.

Minimum capital requirements – this first pillar is dealing with the maintenance of regulatory capital stemming from three different types of risk: credit risk, operational risk and market risk. The capital-ratio is calculated using the same definition which is used in the 1988

accord, and its preceding supplements. The total capital must be no lower than 8% and Tier 2 capital is limited to 100% of Tier 1 capital.

The credit risk is calculated differently from bank to bank in accordance to the riskiness and degree of sophistication of their portfolio. There three different approaches are The Standardized Approach, The internal Ratings-Based Approach and an advanced version of the Internal Ratings-Based Approach (IRB). Under the Standardized Approach the banks are required to use ratings from External Rating Agencies to calculate the required capital. Under the standard and the advanced version of the IRB the banks are allowed to develop their own empirical model to estimate the probability of default and the loss given default (PD/LGD).

The operational risk has also got three approaches for calculating the operational risk capital charges (Basel II - page 140): The Basic indicator Approach (BIA), the Standardized Approach (STA) and Advanced Measurement approaches (AMA). These approaches are also developed with the attempt to adjust to different continuums of increasing sophistication and risk sensitivity. The Basel Committee (2005) defines operational risk as “the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk”.

This accord published by the Basel Committee in 2004 re-defines the definition of market risk originated in the Market Risk Amendment of 1996. The new risk s defined as “trading book issues” and consists of positions in financial instruments and commodities held either with trading intent or in order to hedge other elements of the trading book (Basel II - page 152). For calculating the risk of trading book issues the preferred method is the Value-at-Risk approach which measures the potential gain/loss in a position as a result from adverse movements in the level or volatility of market prices of interest rate instruments, equities, commodities, currencies and financial instruments. (riskinstitute.ch).

These financial instruments are both derivatives instruments and primary instruments or commodities held with trading intent or the intent of hedging. The target is that these financial instruments should be free of any restrictions or covenants on its tradability. These portfolios must be actively managed and frequently valued and also, in order to be able to assess this

risk of “the trading book”, there must be a documented strategy for the portfolio which is approved by senior management.
Specifically in regards to credit derivatives, banks are required to calculate the counterparty credit risk for OTC derivatives and use risk weights that are consistent with the ones used for calculating capital requirements in the banking books. If the standardized approach is used in the banking books, the same approach is to be used on these risk weights. It is important to understand that when a bank uses credit derivatives to hedge assets for capital requirements, the risk of the trading book should be transferred to a third party (Hsaio 2008). This credit risk that has occurred in the trading book still remains even though the risk in the banking book is reduced, but until the risk that occurred in the trading book from hedging capital requirements is transferred to a third party the bank cannot reduce its exposure in the trading book. This process shows that risk can be detached from an asset and become a “property in its own right” and it requires additional contractual engineering to securitize these credit positions. These are contractual engineering techniques that strip the trading book risk as well as the asset risk in the banking book form a new intangible asset.

Supervisory review process –in this second pillar the Basel Committee recognizes the relationship that exists between the amount of capital held by the bank against its risks and the strength and effectiveness of the bank’s risk management and internal control processes. However, they emphasize that increased capital should not be viewed as the only option for addressing the different types of risks the bank is put up against. This pillar must be a supplement to the capital requirements, with guidelines such as to strengthening risk management, applying internal limits, strengthening the level of provisions and reserves, and improving internal controls (Basel II - page 162).

The Basel Committee identifies *four key principles* of supervisory review:

Principle 1: Banks should have a process for assessing their overall capital adequacy in relation to their risk profile and a strategy for maintaining their capital levels (Basel II - page 163). This emphasizes that a bank must be able to demonstrate and defend that the chosen internal capital targets are well founded. The capital targets must also be consistent with the overall risk profile and sophistication in the current operating environment.

Principle 2: Supervisors should review and evaluate banks' internal capital adequacy assessments and strategies, as well as their ability to monitor and ensure their compliance with regulatory capital ratios. Supervisors should take appropriate supervisory action if they are not satisfied with the result of this process (Basel II - page 167). The supervisory authorities should keep regular assessments of the banks' capital adequacy and also ensure that the banks keep on building sound processes to manage internal processes in dealing with risk management. This is done by on-site inspection, off-site reviews, discussion with banking management, review of external auditors work and periodic reporting.

Principle 3: Supervisors should expect banks to operate above the minimum regulatory capital ratios and should have the ability to require banks to hold capital in excess of the minimum (Basel II - page 169). This is a result of the previous two principles, if the supervisory authorities find that the banks risk assessment and capital allocation are not satisfying, they should take appropriate action. There are several means available if individual banks are not operating with adequate levels of capital or within sound risk management. The supervisory may set trigger and target capital ratios or define categories above minimum ratios for identifying the capitalization level of the bank (Basel II – page 169).

Principle 4: Supervisors should seek to intervene at an early stage to prevent capital from falling below the minimum levels required to support the risk characteristics of a particular bank and should require rapid remedial action if capital is not maintained or restored (Basel II - page 170). These actions may include intensifying the monitoring of the bank, restrict the payment of dividends, require the bank to prepare and implement a satisfactory capital adequacy restoration plan, and require the bank to raise additional capital immediately (Basel II - 170).

Market discipline – In the third pillar the Committee aims to encourage market discipline by developing a set of disclosure requirements which will allow market participants to assess key pieces of information on the scope of application, risk exposures, risk assessment processes, and hence the capital adequacy of the bank (Basel II - page 184). The third Pillar is set to be a compliment to the first two Pillars. Market discipline contributes to a safer assessment of capital margins and supervisory authorities can require banks to provide regular reports that can be publicly available. This is positive and would reduce the problem about asymmetric

information (principal/agent) as we have been through in regards of OTC derivatives. The Form 10Q could be an example of this information-disclosure that has been imposed on the banks, by supervisory authorities. The general pointer is that" information is regarded as material if its omission or misquoting could change or influence the assessment or decision of a user relying on that information for the purpose of making economic decisions" (Basel II - page 195).

The third pillar of the Basel II accords recognizes that market discipline has the potential to promote safe and sound capital regulation within banks. The Committee emphasizes that a dissatisfying level of information disclosure is not to be compensated with additional capital requirements.

The Principal Agent Problem is reduced by having a sound market discipline and in collaboration with already existing accounting rules, audited regularly. The problem lies especially within the OTC market where the degree of disclosure of information is below any standard for perfect information, and the possibility for abusing the market becomes severe. The key lies in giving firms incentives for providing sufficient information. Atsem (2010) argues that the solution is optimal when the notion of market discipline instead of a rule-based regime, is enforced. This is because a standard rule-based regime will not allocate benefits from managerial insights. The problem with relying on managerial insight is that the manager will be expected to be operating with the best interest of the owners in mind, and that is why the possible conflict of interest is important to address when relying on market discipline.

4.3.3 Basel III

In late 2009 the Basel Committee published the first version of Basel III: International framework for liquidity risk measurement, standards and monitoring, and in 2010 Basel III: A Global Regulatory Framework for more resilient banks and banking systems. The Committee gave banks approximately three years to satisfy the requirements. The objective with the reform package was to:

"Improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source, thus reducing the risk of spillover from the financial sector to the real economy" (Basel Committee, Basel III 1-1).

The Committee had actually already published a document called "Principles for Sound Liquidity Risk Management and Supervision". The goal for both these publications was to help the banks with liquidity problems that they experienced in the early phase of the financial crisis that began in 2007. Despite adequate capital levels, banks still experienced difficulties because they did not manage their liquidity in a prudent manner. The way liquidity almost instantly shifted from being sufficiently available at low costs to almost evaporate, was a situation that even some of the banks with the higher capital levels were not prepared for. The other problem, which the Basel III was intended for, was that the banking sector in many countries had built up excessive on-and off-balance sheet leverage. Combined with the insufficient liquidity levels – or insufficient management of, the sector had problems coping with the large off-balance sheet exposures that had been building up.

The off-balance risk can in many cases be derivatives and the publication of this reform shows that the regulation of derivatives was not sufficient to prevent major economic downturns.

"Failure to capture major on- and off-balance sheet risks, as well as derivative related exposures, was a key destabilizing factor during the crisis" (Basel Committee, Basel III 3-11).

The response in the framework published in late 2009 was to raise capital requirements for the trading book and complex securitization exposures which was a major source of losses for many international banks. The publication also stresses the importance of shifting OTC derivative contracts to a "central counterparty" by strengthening the capital requirements for counterparty credit exposures arising from banks' derivatives, repo and securities financing activities. Also, banks with large and illiquid derivative exposures to a counterparty will have to apply longer margining periods as a basis for determining the regulatory capital requirement (Basel Committee, Basel III – page 3).

The Committee also supports the efforts of the Committee on Payments and Settlements Systems (CPSS) and the International Organization of Securities Commissions (IOSCO) to establish firm standards for financial market infrastructure, including central counterparties (CCPs). Combined with the increased capital requirements for bilateral OTC derivatives will give banks a strong incentives to shift exposure to these CCPs.

The Credit Valuation Adjustment (CVA) treats the counterparty risk of marking-to-market by adding a CVA Risk Capital Charge, which implies that banks must compliment the capital requirements based on the standardized or internal ratings-based (IRB) approaches with a capital charge to cover the risk related to OTC derivatives. The banks are not required to include transaction with a central counterparty (CCP) or securities financing transactions (SFT), unless the supervisory authority determines that the bank's CVA loss exposure arising from SFT are significant. Those banks who use the internal models approach for the interest – rate risk bonds must calculate additional capital charge by modeling the impact of changes in the counterparties' credit spreads on the CVA of all OTC derivative counterparties.

The Basel III: International framework for liquidity risk measurement, standards and monitoring defines two minimum standards for funding liquidity and these standards have been developed to achieve two separate but complimentary objectives (Basel Committee, Basel II - page 4).

(i) To promote short-term resilience of a bank's liquidity risk profile by ensuring that it has sufficient high-quality liquid assets to survive a significant stress scenario lasting for one month. The Committee developed the Liquidity Coverage Ratio (LCR) for this objective.

The stress scenario is built on the experiences during the global financial crisis that started in 2007 but although it incorporates a significant stress, it is not built on a worst-case scenario (Basel Committee, Basel III – page 9). Amongst the assumptions it incorporates increases in derivative collateral calls and substantial calls on contractual and non-contractual off-balance sheet exposures.

(ii) To promote resilience over a longer time horizon by creating additional incentives for banks to fund their activities with more stable sources of funding on an ongoing basis. The Net Stable Funding Ratio (NSFR) has a time horizon of one year and has been developed to provide a sustainable maturity structure of assets and liabilities.

We can understand that increased banking regulations such as the Basel III will ultimately be positive for both bond- and stock investors. For bondholders, the higher capital requirements will make bond issues safer, and the general increased stability in the financial system will provide a more relaxed cushion for them. For stockholders, the increased regulation might cause the economy to grow at a slower pace, thus causing the stock market to be relatively less profitable in the short run. On the other hand, increased financial- and economic stability will be advantageous in many other areas such as hedging and long-term investors.

4.3.4 Form 10-Q

The filing of the 10-Q is an important and interesting informational event because it occurs frequently and regularly, and the movements in stock prices after a filing is sometimes large. Huddart et al (2006) find that for 5% of the observations, the abnormal return at the filing is less than - 9.78% and for 5% of the observations, it is more than 9.77%. It is also important because compared to informed trade before an earnings announcement; there are reasons to believe the risk due to trade before the filing is lower.

The Form 10-Q is a quarterly report with legal basis in the Securities Exchange Act of 1934, Section 13 or 15(d). Section 13 makes sure that investors are properly protected and that the dealing in securities is fairly conducted by demanding that the companies that hold public securities of a certain size discloses information continuously by filing annual reports (10-Ks), quarterly reports (10-Qs) and reports when certain events occur (8-Ks). The 10-Q report presents information that can help investors evaluate companies' investment activities.

The report consists of two parts, Part I – Financial Information and Part II – Other Information. The first part is split into four items; Financial Statements, Management's Discussion and Analysis of Financial Condition and result of operations, Quantitative and Qualitative disclosure About Market Risk, and Controls and Procedures. Part two is split into 6 different items; Legal proceedings and Risk Factors, Unregistered sales of Equity Securities and Use of Proceeds, Defaults upon Senior Securities, Mine Safety Disclosures, Other Information, and lastly Exhibits.

As we can see from how the 10-Q report is built, the information is not only about specific trades within certain securities, but also information on market risk, and management of

controls and procedures, much like the focus of the later Basel Accords. The report also demands disclosure of unregistered sales of equity securities. The disclosure are information such as date and time, names of principal underwriters and the identity of the buyer, other arrangements for payments such as cash discounts or commissions and also the nature of the transaction . The 10-Q also requires that terms of conversion or exercise are disclosed if the securities sold by the registrant are convertible or exchangeable into equity securities, or are options or warrants representing equity securities. If there are any proceedings from the sale of equity securities, the next periodic report (whichever comes first) should hold information on the use of them. (Code of Federal Regulations - Item 701).

4.4 Summary

This chapter has shown how regulations have developed during the last couple of decades. It shows how financial markets are in a continuous evolution and how important it is that adequate precautions are taken to minimize the negative effects on the real economy in times of financial stress. Even though these regulations are reactive in the sense that the need is in most cases seen after there has been a problem with financial markets, they are important for a sound fundamental basis of terms and conditions within financial markets. We have seen that derivatives and off-balance positions are- and have been a source for concern and we can in many ways defend standardization and central clearing of OTC derivatives.

5. EMPIRIC RESEARCH

5.1 Systematic Risk

The core of the indictment of systematic risk is that the transferring of risk through the use of derivatives are not transferred to non-financial capital, instead the risk is transferred and concentrated in the financial sector. The problem is that financial markets lack the experience and judgment to appropriately weigh the dangers of pricing gaps, while senior management does not necessarily understand the risk they are signing off on (Darby 1994). Even though Darby's study is relatively old, the implications still holds to some degree. The empiric research on systematic risk and derivatives are mainly focused on the listing of options, but during the later decade there has been done quite a substantial amount of research on warrants, swaps and futures as well. The problem is gathering data from OTC-markets because the responsibility for gathering data is diffuse or lacking. This means that it is more difficult to get hold of empiric research regarding OTC-derivatives. The common way (see Gjerde & Saettem (1993) or Chaudhury & Elfakhani (1997)) to study whether the listings of derivatives have any effect on the systematic risk is to measure if there is a significant difference in the median beta-value before and after the listing, or de-listing, of derivatives was introduced. Further on, the f- or t-test is used to measure if the change in average-value of the beta is significant different in the pre and post listing beta-values. Gjerde & Saettem find that literature during the period from 1974 to 1993 supports the conclusion that the listing of options does not affect the systematic risk of the underlying stock. They support the conclusion with their own quantitative research with 7 companies' enlisting of options since the market opened in Norway the 22.may in 1990, where they find no proof of the listing of options to affect the systematic risk in their sample. They also find that total risk is reduced in conjunction with the theory described in Dodd (2001) because of the advantages in risk management and hedging. Table 5.1 shows a summary of ten different studies on systematic risk and derivatives:

Researcher	Data	Findings
Gjerde & Saettem (1993)	7 listings in Norway. 1990-1993	Systematic risk: Not affected
Gorton & Rosen (1995)	16 U.S. banks during 1990-1993. Using interest rate Swaps.	Systematic risk: Not affected
Chaudbury & Elfakhani (1997)	41 delistings during 1975-1989 on TCO, Canada	Systematic risk: Not affected (both with partial and complete delistings
McKenzie et al (2000)	10 individual share futures. ISF, Australia	Systematic risk: Reduced
Zahari et al. (2002)	87 stocks listed on Bursa Malaysia. Warrant listings. 1994-1998	Systematic risk: Not affected
Mazouz & Bowe (2004)	144 stocks (NYSE) vs listed opt	Systematic risk: Not affected
Debasish (2009)	Indian stock market. 1995-2009	Systematic risk: Not affected
Yip & Lai (2009)	96 stocks listed on Bursa Malaysia. Warrant listing. 2003-2007	Systematic risk: Not affected
Bartram et al (2009)	6888 non-financial firms in 47 countries. FX, IR and CP derivative listings	Systematic risk: Reduced
Hassan & Khasawneh (2009)	54 Bank holding companies during 2000-2008. Swaps, Futures, Forwards and Options	Systematic risk: Not affected

Table 5.1 – Empiric research on systematic risk

As we can see from the table above, not one of these studies find there to be an increase in systematic risk on the underlying when derivatives are introduced. Out of these ten studies, Mazouz & Bowe (2004) and Hassan & Khasawneh (2009) are the only two that account for the stochastic time varying feature of the beta and the time varying heteroscedastic error term structure of the market model or single index model. Both Gjerde & Saettem (1993) and Zahari et al (2002) takes into account the time varying feature of the beta, but does not recognize the time varying heteroscedastic error term structure when using the market—or a single index model (SIM). However, Gorton & Rose's (1995) methodology are performed by estimating market values and interest-rate sensitivities of interest-rate swaps to address if these swaps are products that affect systematic risk. Debasish (2009) draws inference on behalf of reduced efficiency in the underlying asset. All Yip & Lai (2009), Bartram et al

(2009), Mckenzie et al (2000) and Chaudbury & Elfakhani (1997) does not incorporated these two features in their regression models.
Chaudhury & Elfakhani (1997) studies the effects of option delisting on volatility and the beta of the underlying stock. The assumption is that whatever the effects of the option listings are, these effects should be reverse as the options is delisted. The study is based on Canadian data and it also studies any difference in the listings limited to smaller versus a larger exchange. Chaudhury & Elfakhani (1997) found that both partial and complete delisting of options had no significant impact on neither the volatility nor the beta of the underlying stock. This goes to show that some of the concerns from regulators are unfounded.

Debasish (2009) find that there is a trade-off between gains and costs when listing derivatives on the underlying asset. The efficiency of the underlying market suffers reduced efficiency on behalf of market stabilization, which implies a reduced systematic risk in the underlying asset. The findings are in line with the theory about derivatives being an important tool for enhancing the market depth and also the importance of how derivatives play an important role in the price discovering process (Dodd 2001). However, in my opinion Debasish (2009) fails to consider the implications of induced inefficiency of the underlying market and how it might be of concern in regards to higher margins and wider bid-ask spreads. It is ultimately important that derivatives trading do not freeze trading and efficiency in the underlying markets.

Exotic derivatives are relatively new in comparison with stock-options and therefore subject of less empiric research. However, Yip & Lai (2007) have studied the effects of warrant listings on Malaysian stocks. Their sample of 96 stocks and their betas are studied in a pre- and post period. The mean of pre and post betas are calculated and then subject to testing of significant change, using the t-test. They find no evidence of significant difference in the two means; hence the null hypothesis (no evidence of impact on the firm's beta) cannot be rejected.

Hassan & Khasawneh (2009) studies how market participants evaluate derivatives contracts in their market risk evaluations. They consider such factors as the size of banks that uses derivatives and whether it affects the evaluation of the banks systematic and unsystematic risk. They find no significant difference between banks that uses derivatives and the banks

that doesn't. McKenzie et al (2000) studies the effect on 10 individual shares in Australia and find that five out of ten betas significantly decreases, three of them decreases insignificantly. The most significant decrease was in the FBG-stock with a reduction in the beta of 30%. To check that the results are not caused by a market-wide trend they turn to their control group and find that all the stocks have an increase in beta, significantly so in two of them. This means that the results are solid and not caused by a market-wide trend.

With the backing of the research that has been presented in this sub-chapter we can safely conclude that the introduction of derivatives does not pose a threat to the levels of systematic risk on the underlying asset. In some cases the systematic risk is actually reduced and in line with the theory about derivatives completing the financial markets and how it gives another dimension to the depth of these markets. These findings are contrary to the suggestions from Dodd (2001) that systematic risk will increase in response to increased levels of leveraging.

5.2 Volatility

As mentioned in the theory chapters, there are two directions in the theory about how derivatives market effect the underlying spot market in regards to volatility. The one which says that the introduction increases volatility due to benefits of leverage and low transaction cost and the second one that is based on noise trading.

The empiric research on the effects on volatility that I have been able to find is based on energy derivatives, futures, index futures, options and IR derivatives (see list). All these derivatives are exchange traded and it was difficult to find any research done on this matter for OTC derivatives. The problem is that OTC derivatives are not formally gathering information about trading that is available to the general public. The table under shows a summary of ten different studies on volatility and derivatives:

Researcher	Data	Findings
Cox (1976)	8 commodities	Volatility: Declining
Flemming & Ostdiek (2000)	Crude oil and energy	Volatility: Increased
Gulen & Mayhew (1999)	Stocks in 25 countries	Volatility: Increase in the United States and Japan, others not affected
Lindén (2000)	90 listings in the Nordic market	Volatility: Decreased
Charupat (2004)	Canadian IR derivatives	Volatility: Not affected
Srinivasan & Bhat (2008)	21 Indian stocks	Volatility: Declining
Siopis & Lyroudi (2007)	FTSE/ASE-20 Index	Volatility: Decreased
Debasish (2009)	15 stocks on BSE	Volatility: Not affected
Ray & Panda (2011)	15 stocks from BSE	Volatility: Not affected
Alexakis (2011)	FTSE/ASE-20 Index	Volatility: Decreased

Table 5.2 – Empiric research on volatility

As the table above shows, the only study that finds any increase in volatility as a result of the introduction of derivatives is Gulen & Mayhew (1999). They find a significant increase in the United States and Japan. But generally speaking, the empiric research points towards that derivatives doesn't make the underlying more volatile. Out of these ten studies there are four studies that do not use the GARCH models to incorporate the time-varying feature in the variance of returns. Out of these four studies, Cox (1976), Linden (2000) and Debasish (2009) does not take into account that the variances are time-varying at all. The last one, Fleming & Ostdiek (2000) does not use any of the GARCH models, instead he argues that the AR(1) structure in their estimation process captures many of the similar characteristics as the GARCH models do. The important difference is that in the AR(1) process model, volatility is stochastic rather than known conditional on historic prices. Fleming & Ostdiek (2000) refers to this feature being attractive because the information in financial markets is stochastic, i.e. random and unpredictable, and ultimately it is information that drives volatility. The six studies that uses the GARCH models both uses the original GARCH model developed by Bollerslev and Taylor (1986) and other variants of the GARCH such as the EGARCH, TGARCH and GJR-GARCH. The GARCH model has its benefit of better capturing the volatility of returns that performs volatility clustering. Volatility clustering is a situation

where a big shock is followed by another big shock, and similarly, when a small shock is followed by another small shock. Both the EGARCH and the TGARCH has their benefits of better capturing the asymmetric features of return series (Nelson 1991).

Ray & Panda (2011) investigates the effects on volatility of the underlying spot market in India when derivative trading is introduced; they extend the research by examining if the effect is immediate or delayed. They use data from 15 stocks registered on the Bombay Stock Exchange (BSE) on which the derivative products are available for trading. The trading in derivatives on Indian stocks was introduced in May 2000 and the study analyses the effect by using one pre derivative period and a post derivate period. To capture the persistency of volatility before and after derivatives are introduced, they use ARCH and GARCH models, and to model the before- and after long rung equilibrium relationships of the markets before- and after the Engle-Granger co-integration techniques are used.. Ray & Panda (2011) find that 8 out of 15 stocks experienced change in structure volatility after implementation of derivatives. These 8 also experienced a stronger persistence of volatility in comparison of the pre derivative period. They also found that stocks became disintegrated with market benchmark index after the introduction of derivatives, all except one stock. This shows that the stocks are independent and not affected by general market movements as mentioned above.

Srinivasan & Bhat (2008) uses the EGARCH to examine the impact of futures trading on the spot market volatility of selected commercial banks in India. The model is proposed by Nelson (1991) to capture asymmetric features of return series, this occurs when an unexpected drop in stock price due to bad news increases volatility more than an unexpected increase in price due to good news in the same magnitude would, which often happens when an investor is risk-averse. This means that the model express the variable as a non-linear function of its own past values that can react asymmetrically to good and bad news. This study considered 21 commercial banking stocks in India during the time period from 1st of January 1996 through 29th of May 2008. They find the introduction of futures market to be a driver for *declining* volatility in the spot market.

The empiric evidence looks quite clear in this case as well; except for the findings of Gulen & Mayhew (1999) in the United States and Japan we can probably defend the generalization that the introduction of derivatives does not cause higher levels of volatility in the underlying.

5.3 Individual behavior

Paredes (2004) studies the behavior of CEO's and the potential causes of CEO overconfidence. The reason why this might be relevant when considering behavior in derivative markets is that he claims that a well paid CEO in many cases overestimates his ability to estimate realistic forecast, especially in costs. Paredes (2004) claims that high executive compensation gives positive feedback to the CEO but it also give the CEO overconfidence. This psychological consequence of executive pay can in many cases result in bad business decisions and overinvesting. In line with the theory about how individuals "frame" some decisions and often relies too much on their ability to manage risk and other factors that in many cases are subject of random walks. Paredes (2004) claim that this is a result of high executive compensation and a possible solution might be to appoint the "devil's advocate" to analytically manage the decision-making of CEO's. The possibility for shareholders to challenge the CEO are often small as in many cases the shareholders are relatively less involved in the details of the business and only exerts influence when voting on more general matters.

As we probably know by now, derivatives gives the possibility for replicating and hedging another dimension. The behavioral result that gives a cause for concern is how many corporations use derivatives to avoid and out-flank financial market regulations that are designed to stabilize and improve the overall economy (Dodd – 2001). Whether or not it is an act of pure speculative behavior or a way to avoid certain regulations that might be a problem for the survival of a corporation, it poses a threat for the survival of global economic survival. Dodd (2001) uses the financial crisis in Mexico and East Asia as an example where institutions used derivatives (total rate of return swaps) to out-flank regulations that originally were made to limit those institutions' exposure to foreign exchange risk. Dodd (2001) also mention the possibility to use derivatives to restructure the flow of payments so that earnings are reported in one period instead of another, the possibility to use foreign exchange derivatives to improve the ability to mount an attack on a developing country's exchange rate.

These are some examples of how derivatives can be used by individuals or corporations to manipulate their original purpose.

Levine (1986) started as a trainee at Citibank in 1978 and was a well above average ambitious man. He was sentenced to prison for insider trading and had to serve a prison sentence for several years. He started trading on information as he referred to as "hot stock tips" at that time, but eventually he realized that this was insider trading. He realized that what he was doing was wrong, but he says he rationalized it as harmless. He claimed that the frequent run-ups in target-company stock prices before mergers proved that others were doing it too. Levine's story goes from buying stocks in a company that "he had been told might be a good investment" to opening off-shore accounts in Switzerland, calling in trades from public phones and using code-names when talking to the off-shore bank. He and a partner would team up and give each other information about sound prospects. Of course, Levine did not buy the stocks blindly; he did his own research to insure himself that the transaction would not be a catastrophe if it did not materialize. In 1985 the SEC had inevitably caught up with his off-balance activities and along with his other associates he was sentenced to prison. He changed his lifestyle and started an advisory firm when he eventually had served his time, an advisory firm that would advise companies about raising money and doing deals. He also started spending a lot more time with his family and named his firm after his two children. This is an example of how easy it is to fall into the trap where you start defending the illegal and questionable behavior as an individual gradually adapts to new levels of risk-taking and also how one becomes a product of its own surroundings. This is in line with the earlier theory presented in regards to risk and individual behavior.

Lo (2011) studies the neuro-scientific perspective of behavior in financial crisis. He finds that financial markets and the individuals operating in them are rarely always rational, nor always emotional. They are always interacting with the circumstances and engage in both types of mental processes, much like what was presented in the earlier chapters in this thesis. Lo calls this the "Adaptive Market Hypothesis" and say that even though the tenets of market efficiency and rational behavior may not hold at all times, they serve as useful benchmarks. The study suggests that the best way to cope with this cyclicality of behavior and financial markets is to impose countercyclical capital requirements. He also suggest that the financial markets should have a "Capital Market Safety board", a team of experienced professionals,

forensic accountants, financial engineers from industry and academia and securities and tax attorneys, who will work together to investigate the collapse of major institutions and create reports and studies which becomes available for everyone. This is suggested to be able to quickly learn from all major financial turmoil's and adapt regulations and laws accordingly.

Ishikawa (2009) worked for Goldman Sachs, Morgan Stanley and ABN MRO, where he structured, syndicated and sold credit derivatives, CDO's and securities products to investors globally. He claims that it was the system which bankers operate in that was the root cause, not the individuals working in it. He claims that these individuals only did what any rational human being would have done. He points to the possibility of earning millions but still not lose their shirt if the investment went bad because they took on risk on behalf of their employer and clients, not themselves. Credit securitization bankers were driven by a culture of "bonus by right" and an excessive lifestyle but they still had a legal and moral obligation to their shareholders – to make profits. This means taking advantage of gaps in supply and demand, which amongst other things was accomplished through the creation of securitization and derivative products. The question is how far this obligation to shareholders goes, and whether the obligation is solely based on taking advantage of gaps in supply and demand, rather than making good investments.

Sornette & Woodard (2009) studies the financial crisis of 2008 and turn on some of the interventions as dangerous and ill-advised. They point out research on herding and imitation as one of the problems leading up to a burst of bubble. They support their reasoning on theory that imitation is found in highly social living species which shows intelligent behavior and signs of evolution and culture. In non-natural agents such as robots, imitation is a principal tool for the easing of programming and complex tasks. It is also endowing the ability to share skills amongst robots without the intervention of a programmer.

5.4 Liquidity

This part will carefully go through studies that have been made on how derivatives affect the liquidity of the underlying asset. As pointed out in the parts on systematic risk and volatility, the empiric research done on OTC derivatives are limited. The table beneath shows the results of ten studies made in derivatives effect on liquidity:

Researcher	Data	Findings
Kumar et al (1998)	Option listings on CBOE, NYSE, PSE, PHLX 1983-1989	Decrease in bid-ask spread and quoted depth increase, i.e increased liquidity.
Kumar et al (2002)	Indian stock market	No change in liquidity of underlying stocks
Laganá et al (2006)	European credit market (CDS)	Credit derivatives improve both "search liquidity" and "systemic liquidity"
Tang & Yan (2007)	CDS for non-Sovereign U.S bonds. 1997-2006	Strong evidence of illiquidity premium in CDS markets.
Bose & Bhaumik (2007)	2000-2006 in the NSE India	Significant increase in volume on expiration day.
Reynolds et al (2007)	Non-financial companies during 1994-1999 listed on NZX (New Zealand)	Negative relationship between derivative usage and liquidity
Maniar (2007)	NSE Nifty-50 Index 2001-2006	Increase in volume of the underlying index, stabile after the expiration of the derivatives that are used as samples.
Wang et al (2008)	H-Share stock index, H-Share index futures. 2003-2005. 78 stocks. Hang Seng Index China	No change in liquidity of underlying stocks
Bhaumik (2008)	NSE India 1995-2007	Increased levels of liquidity coupled with decreased levels of volatility. Decrease of liquidity in the underlying security.
Kalra (2010)	SEBI (India), futures listings on 60 stocks in the period of 2001-2003	Both increase and decrease in levels of illiquidity, depending on levels before the introduction

Table 5.3 – Empiric research on volatility

The results are in general quite clear. The three studies that find a negative relationship between using derivatives and liquidity are Reynolds et al (2007), Bhaumik (2008) and Kalra (2010). Reynolds (2007) suggests that the firms that show this attribute may be financial constrained. The table lists ten different studies, and again it was not easy to track down research that was made on OTC derivatives. Out of these ten studies only Laganá et al (2006) and Tang & Yan (2007) are the ones that base their research on OTC derivatives; in both cases they use Credit Default Swaps (CDS). Their conclusion is however in line with general picture of the other nine studies, derivatives are a positive contribution to liquidity in the underlying markets. Laganá et al (2006) claims that one of the most important financial innovations in recent years has been the creation of liquid credit instruments. This enables the possibility for separating default risk from single stocks. They emphasize that the pillars for this possibility have been the development of CDSs. There are two reasons according to

Laganá et al (2006) for this, one being that CDS are more standardized than other credit risk transfer instruments and the other being that CDS contracts allows traders to go long credit risk without a cash payment, and go short credit risk with less difficulty and lower costs than what is possible with corporate bonds. Of course this possibility for going both short and long in credit risk constraints the market maker because in contrast to most OTC derivatives, the possibility for central clearing relies on margin capital to be willing to hold credit risk. I will come back to how margin capital and guarantee funds are essential for central counterparties being able to withstand the threats of systemic risk in the next sub-chapter on regulations.

Bose & Bhaumik (2007) find that stock volume increase on expiration day. A year later, Bhaumik (2008) studies the effect of pre- and post periods of the introduction of options and futures. They find the introduction of futures to cause a significant decrease in spot volatility, but an insignificant decrease for options. For the underlying security they find that volumes is reduced because of the assumption that speculators migrate to derivative markets because of the lower cost and opportunity for leverage, the latter being in line with Stein (1987) and Hong (2000).These results are in line with the theoretical underpinnings that all else being equal a market place with larger capacity to absorb demands for liquidity will be less volatile than smaller ones (Bhaumik 2008).

Kalra (2010) uses the Amihud measure for illiquidity and find that in the short run, illiquidity has significantly increased. He re-examines the results by dividing the sample into four quartiles based on the pre-listing level of illiquidity. The quartile where pre-levels of liquidity were low shows a significant increase in liquidity and the quartile of high pre-levels of liquidity is reduced, but not significantly so. In the long run results show that for the stocks, which are highly illiquid during pre-listing period, the illiquidity levels drops significantly. For the other stocks, levels of illiquidity have increased in the post-listing period. He also analyses the effect on volume, number of trades and volatility. Both volume and number of trades is significantly reduced, volatility is also reduced but not significantly so.

Laganá et al (2006) offers a new framework for the assessment of financial market liquidity. It introduces two types of liquidity; search liquidity and systemic liquidity. Search liquidity is driven by search costs required to actually sell the asset, and vice versa. Search liquidity is asset specific. Systemic liquidity is driven by the homogeneity of investors, meaning the

degree to which a decision to sell or buy an asset is related to imitation or not. This kind of liquidity is specific for groups of investors. They find that this framework proves important in indentifying the role of credit derivatives and the need for transparency in corporate bond markets. The research is based on the European credit market and finds that credit derivatives are likely to improve both search- and systemic liquidity. The result that liquidity is improved is in line with Maniar (2007).

5.5 Regulations

As the Basel I accord was the prophet for setting a standard for the definition of bank capital, hence in its tier one: Core Capital, and tier two: Supplementary Capital, the Basel II accord was designed to ensure capital adequacy on multinational banks. Capital holdings should not be a significant source of competitive inequality between multinational banks and this accord was designed to ensure that these standards were set equal for all banks. Ultimately, regulators feared that if capital holdings became a source for competitiveness it would make banks more vulnerable because banks would want to hold less capital. Holding less capital tied up would mean that they had more capital to engage in investments that might give them higher returns.

This regulatory requirement which prevents regulatory arbitrage and the probability of default also say that bank capital must cover losses due to loan defaults with a certain probability. The adverse selection problem when protection sellers do not know the true type of the protection buyer is often solved by using Collateralized Debt Obligations (CDOs). Under the Basel I, a CDO is not subject to capital requirements as they are public contracts. The key understanding is that banks signal their own type by retaining a certain tranche of in these CDOs. A CDO is built up in multiple tranches where the tranche of highest probability of default is referred to as the “junior tranche” or the “equity tranche” and the most “safe” tranche is referred to as the “senior tranche”. Of course, the junior tranche gives the highest interest rates, compensating the investor for the high levels of risk. However, under the Basel II CDOs became subject of capital requirements and that made it more costly for banks that held the junior tranches, since it had to retain enough bank capital to cover its losses and satisfy capital requirements. When credit derivatives are traded private, a bank with limited possibility to choose only customers with high credit ratings is able to hide its junior tranche and avoid allocating capital to cover possible losses or satisfy requirements. This means that

the cost of capital is not affecting the incentive to mimic the bank that is able to choose high-rated customers and again this means that the junior tranche is not affected by the cost of capital. If junior tranches are not affected by the cost of capital this gives the bank with high-rated customers an incentive to hold significant amounts of capital in order to prevent defaults. It then follows that if the cost of capital is large enough the equilibrium is not sustainable because the bank would rather hedge this risk than face the cost of capital (Nicolo & Pelizzon 2008). This reasoning shows the importance of information being public available in regards to the problem of adverse selection. It also shows how banks adapts to how regulations are designed.

Atsem (2010) looks at the third pillar of the Basel II accord, market discipline. The problem with market discipline is that if not handled correctly it can create serious problems in regards to moral hazard. The so called government safety net provides a cushion for bank managers to engage in risky investments because they know that they have the backing of the government as they to some level are insured by the government. More on, another problem with moral hazard is when banks become too big to fail. In this case the managers know that they will be bailed out by the government because of the systemic downturn it would create if it defaulted. This puts them in the hot-seat for engaging in risky investments and pushing prices up because of its market power. Eventually their prices will not be based on the service and the quality of the product and we can see an example where hard-wired rules could prevent banks engaging in mergers etc. The Glass-Stegall Act of 1933, which was re-appealed in 1999, is a type of regulation that addressed this problem, but it also restricts the possibility for competitive markets in some ways. The problem is that increased competition can increase possibilities for moral hazard and the opposite can cause too much monopoly power which leads to higher prices for consumers. The Glass-Stegall Act puts restrictions on branching and regulates how corporations can become conglomerates and prevent non-bank institutions from competing with banks by engaging in banking business. A response to the Glass-Stegall act is the Gramm-Leach Bliley Act also known as the Citigroup relief Act. It enabled CitiGroup to merge with Travelers Corp and its front-man, Robert Rubin would in later years make over a hundred million dollars as Chairman of Citigroup. President Obama stated that the Gramm-Leach Bliley Act led to the regulation that amongst other things, allowed the creation of giant financial conglomerates. Critics such as Robert Eklund and Mark Thornton have claimed that this Act would have made sense in an economy regulated by the gold standard, 100% reserve

banking and no FDIC deposit insurance, but in the current fiat monetary system it amounts to corporate welfare for financial institutions and problems with moral hazard that eventually would harm taxpayers. Atsem (2010) points to the Basel II accord and its allowance for institutions to use publicly available assessment of private credit rating agencies as well as their own internal credit ratings as a contribution for the promotion of market discipline, in many ways a questionable practice. As we are familiar with in the financial chaos of 2008, one of the problems was how debt had been inaccurately assessed and rated higher for purposes of own good and the companies who paid the issuing companies.

In light of the assessment of OTC derivatives versus exchange traded derivatives regulators have focused on prioritizing the use of central clearing in order to reduce systemic risk. This means that the central counterparty holds the responsibility for both parties fulfillment of the trade. One of these initiatives is how regulatory efforts have significantly improved the processing systems of derivatives trading. In 2005, for every 100 new trades that a dealer executed, there were about 1000 aged unconfirmed trades. In 2006 the effect was quite significant and for every 100 new credit derivative transactions there were fewer than 10 aged unconfirmed trades. Duffie et al (2010) claim that if the pre-2006 levels had persisted, the collapse of Lehman Brothers could have been far more chaotic. This was because of the potential for a systematically defensive behavior by those market participants who not were aware of the extent for their credit derivatives exposure. Of, course not only to Lehman Brothers, but also to other large counterparties. Another positive regulatory contribution is how before 2007, active market participant held large amounts of long and short CDS positions simultaneously, referring the same underlying borrower. This was seen as a significant redundant unnecessary exposure and offered not economic benefit. The regulators demanded that these portfolios were compressed and by January 2008, nearly 50 trillion dollars in notional amount of outstanding CDS positions have been eliminated. Regulators also required that market participant set up a mandatory protocol that the two parties involved in a trade would obtain the consent of those parties remaining in the trade. This initiative was designed to give market participants more transparency over their counterparties (Duffie et al 2010). This last initiative is one that addresses the critics of OTC markets and how the transparency is lacking. However, a problem with this is whether this information is easily accessible and if there is a central governing institution that has the responsibility to gather

this information and make it available for the general public. If not, the initiative will probably not release its full potential.

The use of a Central Counterparty Clearing (CCP) is vital to the stability and vulnerability of the derivatives market. This CCP takes the unsystematically distributed credit risk and centralizes it within this clearinghouse. If on side in a trade defaults, other participants are not affected because of the CCP who bears all of the credit risk. The only way one market participant could be affected by the default of another market participant is if the default is in such magnitudes that it affects the whole system, i.e. systemic. And as we know, this systemic risk is an undiversifiable. The figure below shows the advantage of a CCP.

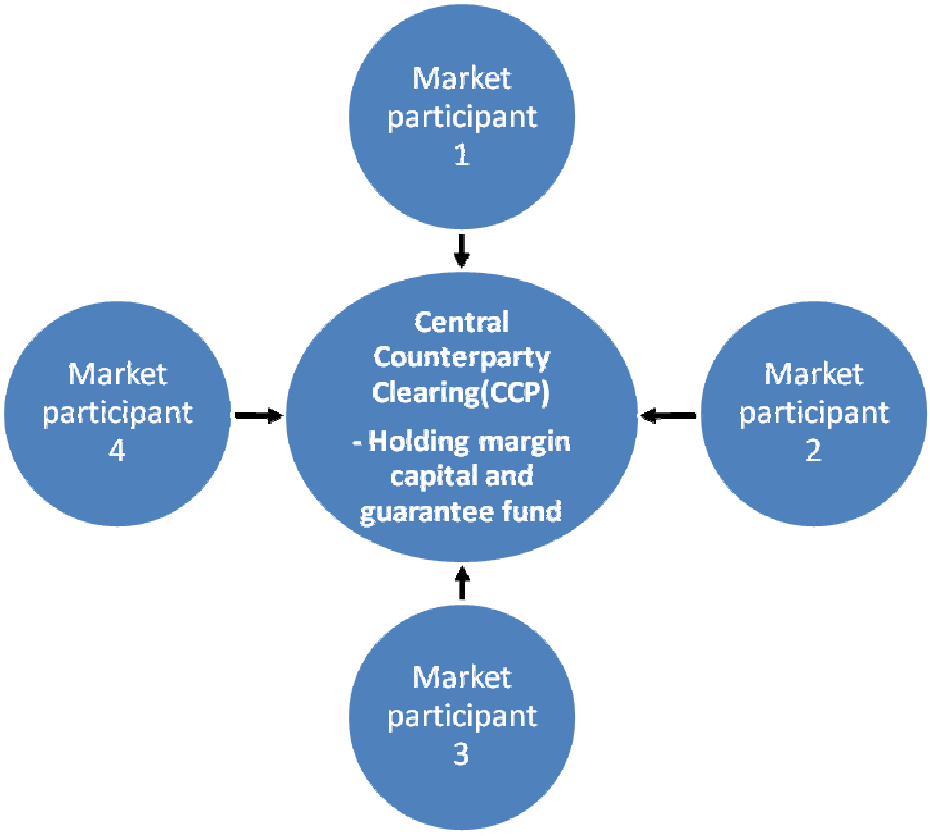

Figure 5.7 – Centralization of risk when using Central Counterparty Clearing.

The figure above shows how risk is centralized at the CCP and how none of the market participants deals with the other market participants. This idea is especially important for OTC derivatives and is vital for centralizing risk in a controlled environment that is capable of dealing with all market scenarios. The CCP must be subject to several regulatory measures,

some of the most important will be to ensure that the CCP has a top of the line management, robust financial resources to withstand extreme loss scenarios and insuring that these measures are continuously reassessed by both the CCP and regulatory authorities. Because CCPs has not yet been mandated or been given sufficiently regulatory capital the CCPs chooses what and what not to clear based on the cost of clearing. This jeopardizes the advantages of the use of a CCP because the ultimate goal for CCPs should be clearing of those products that pose a risk on overall economy via systemic risk. Another important factor is that the market participants should be encouraged to hold the exposures in one asset class limited to one CCP. This gives the advantage of the CCP being able to net positive against negative counterparty exposure, ultimately without increasing systemic risk. A possible solution to this problem might be to allow market participants to move open positions from one CCP to another. A negative side to the use of central clearing is the fact that central clearing demands margin capital from the end-user. OTC derivatives that are not cleared normally have no margin collateral because it is assumed that the dealers incorporate the cost of credit in the price of their uncollateralized derivatives positions. End-users are normally not systematically important players in financial markets, but larger uncleared end-user positions poses a risk to the CCP and therefore clearing regulations should have criteria for exemption of clearing that considers the amount of trades by the end-user, gross size of positions and to what degree the derivatives trading has non-financial business objectives. For this consideration, clearing regulators can use data gathered by the CCP and if the CCP are legislated to hold this information, regulators are in a better position to monitor risk taking by individual market participants and its exposure in certain asset classes.

Now, a simple approach to the problems that OTC derivatives pose would be to ban all OTC derivatives trading. Of course it is not that easy; some say that it would do more harm than good (Duffie et al 2010), the reasoning is unquestionable. Let us look at some of the immediate effects. Firstly, the derivatives that are traded on exchanges demands a high level of flow in orders, partly because of some entry fees of setting up the possibility for trading in new derivatives. Another problem is that the exchange's matching of supply and demand requires relatively active orders submissions from buyers and sellers. Others say that many of the derivatives that are traded OTC are in many cases available at exchanges, but maybe not in the exact same wrapping. This is a problem for many buyers because of the way OTC derivatives are customized specifically for their needs. At the market level this would cause

many corporations to lose their ability to hedge certain business risks caused by fluctuations in prices such as currency prices, interest rates and default risks. Some are concerned that if OTC derivatives trading would be banned it would have a negative impact on financial innovation. Duffie et al. (2010) claim that financial innovation spurs economic growth, it might have done so in the later decades, but in my opinion, financial innovations and engineering should not be the ultimate source for economic growth. The source for economic growth should stem from the production of goods and services in other sectors than the financial one. The financial sector should focus in its initial purpose, enabling risk-sharing between those that do and those that do not want to be exposed to risk.

The challenges in OTC derivatives markets are now acknowledged by the G20 in 2009 and they have mandated a comprehensive reform of these markets. Central clearing will be one of the main areas that will be reformed. The goal is that all standardized OTC derivative contracts are to be traded on exchanges or electronic platforms and cleared by central counterparties by the end of 2012 (Sidanius & Wetherilt 2012). In the U.S. it is the Commodities Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC) that is in charge of designing these rules. These rules are a part of the Dodd-Frank Act. In Europe, the European Commission has this responsibility and this reform is to be designed within the European Market Infrastructure Regulation (EMIR). There have been reports of some reports on delays on this reform by the Financial Stability Board (FSB) (financialstabilityboard.org).

Figure 5.8 – The process of achieving Central Clearing. *(Source: Bank of England)*

The figure above shows how the process of central clearing is developing. The five steps are all important for being able to have a sound process that facilitates the use of central clearing. Having standardized legal terms is important because it sets the basis of how counterparties are to interact with each other and defines common legal documentation and definitions. It is also important to have a specification on standardized products, step two. The third step is to capture economic terms so that counterparties can confirm transactions and it is also important for electronic trade processing (ETP). Straight-through processes make sure that the trades are processed safely and also that trades are effectively matched and netted in real time. This four are necessary for being able to use Central clearing. As we can see from the table, there is still quite a lot of work to be done in the matters of central clearing of OTC derivatives. The figure below shows that there are significant amounts of OTC derivatives trading that are automated already:

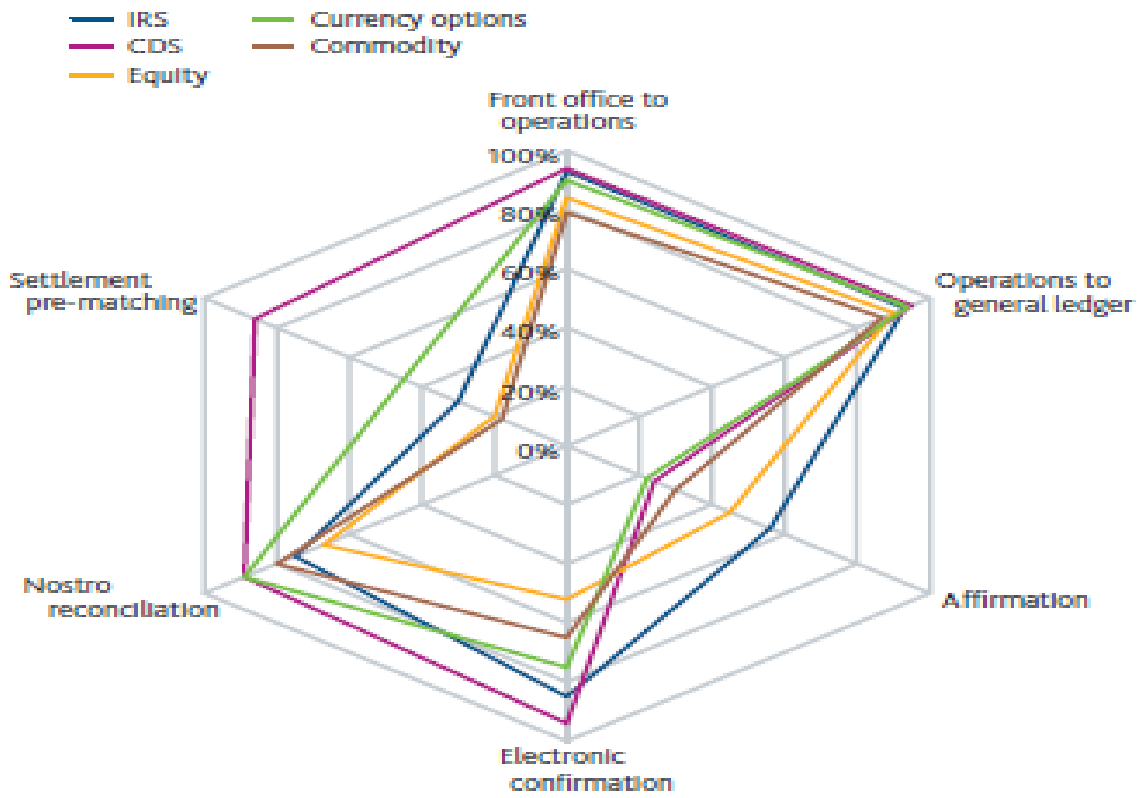

Figure 5.9 – Automation of trading within OTC derivatives*. (Source: International Swaps and Derivatives Association).*

Central clearing for OTC interest rate swaps have actually been in place for over a decade with more than 50% of the market being cleared and new trades cleared by a rate of 92 % in

the G14 (G14 dealers are the fourteen biggest OTC derivatives dealers).The part of these trades that are electronically confirmed is at 85%. These trades exhibit many attributes that have been mentioned above as necessary for central clearing. Almost all trades are executed under standard legal terms and most documentation and operational processes are standardized (Sidanius & Wetherilt, Bank of England 2012). This could serve as a good example for other products that have not got as far in the process of central clearing. It also shows us that it is possible and maybe we are not that far behind on this matter as previously expected. Although, credit derivatives are far behind with a share of the market about 10% that are centrally cleared, but electronic confirmation of trades are high at 95%.

Before concluding, it is obvious how the financial industry needs more guidance on which products that should be subject of central clearing, this guidance must be in cooperation with CCPs and their biggest dealers. A bottom-up approach seems reasonable. It is also important to realize that CCPs must be subject for monitoring and risk-management processes must be subject of continuing improvement. It seems evident that less liquid products has to be less automated and are unlikely to be suitable for central clearing due to low volumes, but again it is important to understand that when deciding what to clear centrally, the net reduction in systemic risk must be the main deciding factor.

6. CONCLUSION

6.1 The effects of derivatives

This thesis finds that systematic risk does not increase when derivative trading on the underlying asset is introduced. My study on empiric research does not find any studies that can show that the systematic risk has increased. As the ten different studies have used a variety of approaches to research this matter, the area can be said to be covered both qualitatively and quantitatively in a satisfying matter. However, the effects of OTC derivatives remain unknown because of the difficulty to obtain data and research on this type of derivative.

For the part on volatility it was also difficult to obtain research done on OTC derivatives. However, exchange traded derivatives does not seem to have any unwanted effect on the underlying spot market volatility. In my study only one study partially found evidence of a significant increase in volatility when derivatives are introduced. The empiric studies gathered on volatility does also use several approaches to explain the effect, both GARCH models and AR(1) models are used.

This thesis has also covered the aspect on how individual behavior is affected by derivatives in financial markets. Empiric research finds that several issues are relevant for understanding individual behavior; over-confidence, outflanking of regulations and also neuro-scientific issues are also considered. These are issues that are all relevant to understand how individual behavior is affected by the incentives that lie within derivatives markets. The analyses in this thesis also cover specific cases of how some of these issues have played out in real life situations and shows us how they should be addressed carefully. After all, we are only human. There is a worrying sign that Wall Street Executives and other Financial Executives are so highly compensated. The salaries of some of these executives are far beyond what can be justified for anyone. How these people sees themselves as a class of people that deserves such levels of compensation is in line with the predictions of the famous economist Thorstein Veblen on how a group of people he called “the leisure class” would ruin the economy. He said that their conspicuous consumption was to no productive contribution and eventually this would lead the American economy to be corrupted by these businessmen. This was a

prediction that he had made based on such tendencies he saw at his time during the last half of the nineteenth century. During the last financial crisis of 2007 this is an insight that can be called for its rightful consideration in my opinion.

In the case of the liquidity effect from derivatives introduction I was able to obtain two studies that had been done on OTC derivatives. Both used CDSs as the subject for research and the conclusion was no significant effect on the liquidity of the underlying. Laganá et al. (2006) points to the fact that CDS contracts are in general more standardized than other credit instruments and how this may be the reason for no significant negative effect. On the other hand there are three studies that find significant evidence of a decrease in liquidity in the underlying security. That shows how spot markets are easily substituted for the advantages of derivatives markets. The worry is how leverage causes distress to be more severe than if there were always a one-to-one relationship between number of stocks and speculators on that specific stock. In case of a default, the magnitude of the default is not equal to the market value but the notional amount outstanding, the magnitude becomes the accumulated amount of all leveraged positions.

6.2 The regulation of derivatives

Regulations have had challenges of great magnitude. It is easy to see how the Basel Accords has to adapt to the ever changing nature of the financial markets. The problem might seem that most of these regulations are reactive and not proactive. I think that the ability to foresee the result of development and accordingly address these issues before the real economy suffers due to financial stress is crucial. Examples of some of the major regulative initiatives shows this; the Securities And Exchange Act of 1934, a result of the depression that started in 1929, the first Basel accord that were designed after a period of turmoil around the world in the 80s and 90s, the second Basel accord that came immediately after the dot com bubbles burst, and now, the Basel III that is in many ways a response to the financial chaos that unfolded in 2007. However, empiric literature shows a lot of promising measures that will address some of the issues that OTC derivatives are representing. The role of the CCP seems evident to make markets less opaque and limit how some OTC derivatives can cause concern for systemic risk issues. The use of CCPs will reduce systemic risk because of the ability to net transactions which reduces counterparty risk as well as the cash flow between counterparties. The CCP will also face the risk of defaults by market participants which they

are a counterparty to, and it will be crucial that the CCP engages in sound risk management and sufficient margin requirements to cope with a possible default. The importance is no less than for other organized exchanges. The CCP must operate as information provider to the general public and the regulatory authority to help reduces the problem of asymmetric information. How the official credit rating of Lehman Brothers was at high levels only short time before its collapse shows how vital it is that information is made available at all time in order to be able to assess an institutions financial position. Regulators need to work closely in cooperation with CCPs in order to maintain standards so that information can reveal systemically important relationship. It is also important that the organization of CCPs is such that CCPs does not start to competed for market shares by lowering margin requirements etc. This will only work against the original purpose and regulators are the ultimate party for setting these standards. As the initiative from the CFTC in 1998 to impose regulations on OTC derivatives was turned down by Clinton administration, let us hope that the latest Basel accord and other regulations from central authorities do not meet the same resistance.

Another concern is how financial institutions are allowed to become too big to fail. This immediately raises moral hazard issues. Banks must be allowed to go bankrupt in order to allocate resources in the most optimal way, and when conglomerates merges to gigantic institutions the problem of systemic risk becomes so severe that the government has to play the role as a lender of last resort. This is in my opinion not a healthy practice and we have seen how the regulation of such merges by the Glass-Steagall Act of 1933 is surpassed by never acts that seem suspicious in its motives. Hedge fund billionaire George Soros emphasized the compartmentalization of banks and claimed that if financial markets are more compartmentalized, the threat to systemic risk would be less severe in case of a default or single compartmental crisis. Allowing everybody to engage in everything will do the opposite. That is an important point because the development in technology has alongside with globalization made access across countries and continents as easy as never before.

On a concluding remark, if we succeed in making information on OTC derivatives more available through some of the measures that has been discussed throughout this thesis, it will be interesting to see whether the conclusions made in this thesis will be affected when one can exclusively base the study on OTC derivatives.

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Appendix 1:

Source: Bank for International Settlements

Global OTC derivatives market[1]

Amounts outstanding, in billions of US dollars

	Notional amounts outstanding				Gross market value			
	H2 2009	H1 2010	H2 2010	H1 2011	H2 2009	H1 2010	H2 2010	H1 2011
GRAND TOTAL	**603,900**	**582,685**	**601,046**	**707,569**	**21,542**	**24,697**	**21,296**	**19,518**
A. Foreign exchange contracts	**49,181**	**53,153**	**57,796**	**64,698**	**2,070**	**2,544**	**2,482**	**2,336**
Outright forwards and forex swaps	23,129	25,624	28,433	31,113	683	930	886	777
Currency swaps	16,509	16,360	19,271	22,228	1,043	1,201	1,235	1,227
Options	9,543	11,170	10,092	11,358	344	413	362	332
Memo: Exchange-traded contracts[2]	*292*	*348*	*316*	*389*	...	...	...	...
B. Interest rate contracts[3]	**449,875**	**451,831**	**465,260**	**553,880**	**14,020**	**17,533**	**14,746**	**13,244**
FRAs	51,779	56,242	51,587	55,842	80	81	206	60
Swaps	349,288	347,508	364,377	441,615	12,576	15,951	13,139	11,864
Options	48,808	48,081	49,295	56,423	1,364	1,501	1,401	1,319
Memo: Exchange-traded contracts[2]	*67,292*	*69,756*	*62,232*	*76,157*	...	...	...	...
C. Equity-linked contracts	**5,937**	**6,260**	**5,635**	**6,841**	**708**	**706**	**648**	**708**
Forwards and swaps	1,652	1,754	1,828	2,029	176	189	167	176
Options	4,285	4,506	3,807	4,813	532	518	480	532
Memo: Exchange-traded contracts[2]	*5,790*	*5,536*	*5,718*	*6,426*	...	...	...	...
D. Commodity contracts[4]	**2,944**	**2,852**	**2,922**	**3,197**	**545**	**458**	**526**	**471**
Gold	423	417	397	468	48	45	47	50
Other	2,521	2,434	2,525	2,729	497	413	479	421
Forwards and swaps	1,675	1,551	1,781	1,846	...	...	...	...
Options	846	883	744	883	...	...	...	...
E. Credit default swaps[5]	**32,693**	**30,261**	**29,898**	**32,409**	**1,801**	**1,666**	**1,351**	**1,345**
Single-name instruments	21,917	18,494	18,145	18,105	1,243	993	884	854
Multi-name instruments	10,776	11,767	11,753	14,305	558	673	466	490
Index products	...	...	7,476	12,473	...	...	...	...
F. Unallocated[6]	**63,270**	**38,329**	**39,536**	**46,543**	**2,398**	**1,789**	**1,543**	**1,414**
GROSS CREDIT EXPOSURE[7]	...	...	...	...	**3,521**	**3,581**	**3,480**	**2,971**
Memo: Exchange-traded contracts[2,8]	*73,375*	*75,639*	*68,265*	*82,972*	...	...	...	...

[1] Data on total notional amounts outstanding, gross market value and gross credit exposure are shown on a net basis, ie transactions between reporting dealers are counted only once. The definitions of notional amounts outstanding, gross market value and gross credit exposure are available under section 2 of the statistical notes. [2] Sources: FOW TRADEdata; Futures Industry Association; various futures and options exchanges. [3] Single currency contracts only. [4] Adjustments for double-counting partly estimated. [5] See Tables 4 to 8. [6] Includes foreign exchange, interest rate, equity, commodity and credit derivatives of non-reporting institutions, based on the latest Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity, in 2010. [7] Before 2011, excludes CDS contracts for all countries except the United States. [8] Excludes commodity contracts.