Curtailing Commodity Derivative Markets

seo economic research

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What are the consequences for the energy sector?

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Foreword

In the aftermath of the financial crisis the G-20 Summit of 2009 agreed in Pittsburgh to "fix the broken regulatory system", pointing to the need for "sweeping reforms to reduce the risk that financial excesses will again destabilize the global economy". Such measures are currently implemented in the European Union through a diverse package of directives and regulations aiming to improve transparency and stability of financial markets, such as Mifid (Markets in financial instruments directive) and Emir (European market infrastructure regulation).

From an economic point of view regulation is a better instrument to improve the stability of the financial system than direct government intervention, such as money market transactions of the ECB and government support for failing banks. Direct intervention always emerges after the harm is done and incurs great economic costs, while regulation is aimed at preventing economic harm in the first place. Another advantage of regulation is that it can be designed carefully without the public pressure of "the need to act" which motivates direct government intervention in troublesome times. The legislation for improving the stability and transparency of financial markets proposed by the European Commission currently proceeds through this process of review and revision.

Economic research should play a crucial role in the design and implementation of improved and extended regulation for financial markets, even though a call for modesty is in place given the inability of economic science to prevent the financial crisis of 2008 in the first place. The ripple effect of the financial crisis of 2008 points to the need to contain the systemic risk in financial markets, economic shocks propagating from one market to another and thus affecting the global economy at large. This is the negative externality or market failure that regulation for financial markets should redress. But in spite of the advanced legislative process there is still little information on the effectiveness of the proposed legislation in redressing this core problem of financial markets. This lacuna in our knowledge becomes even more pressing when the regulation is extended to economic sectors which indirectly fall under the scope of the financial system, such as derivative trading on energy commodity markets. Can one safely assume that the systemic risk of the financial system also applies to these commodity-based markets? This is a typical question for economic research and it is surprising that this vital question has not yet been answered.

Regulation is often seen as a free lunch but economists know that the benefits of regulation need to balanced against its costs in terms of monitoring and compliance costs but also in terms of the loss of economic welfare caused by the regulation. Knowledge of these social costs and benefits may aid policy makers in the design and implementation of such rules. This study underscores the need to collect such information at an early stage in the policy making process. It investigates the economic impact of the proposed European regulation for financial markets on derivative trading in energy-commodity markets and concludes that the economic risks of these markets are of a different nature than the systemic risk of the worldwide financial system. Further it calculates the economic costs of the new financial regulation for energy companies in the Netherlands. The conclusion is that the economic benefit of the regulation for the energy markets is uncertain and small at the most, while the expected costs for the economy as a whole are real and high.

I recommend this study to all policy makers and politicians involved in the decision making process for regulating financial markets. The news daily testifies of the need to improve the stability of the global financial markets, but the stakes are too high to achieve this aim without consideration of the economic costs for specific markets. Economic research such as presented in this report shows that the goal of improved financial stability can be achieved at lower economic costs if the design of the regulation is carefully executed, with due consideration of the impact of the regulation on specific economic markets such as the energy sector.

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Executive Summary

The introduction of EMIR in the energy derivative markets generates higher social costs than benefits and therefore has a negative impact on economic welfare in the Netherlands. This impact is estimated to be in total circa € 2,4 to 3 billion.

This study investigates the economic impact of EMIR, the European Market Infrastructure Regulation, which aims to increase financial stability of Over-the-Counter (OTC) trading on derivative markets. This regulation introduces a reporting obligation for OTC derivatives as well as compulsory central clearing.

Potentially the impact of this proposal on energy markets is substantial, given the natural and historically established connection between forward trading and the physical production of energy. This study aims to analyze this impact by answering the following set of questions:

- Why regulate energy commodity derivative markets? Do these markets suffer from a socially undesired degree of financial instability and is EMIR an effective solution to this perceived problem?
- What are the economic effects on the energy market when the current proposal for EMIR is implemented?
- What is the welfare effect associated with the economic impact of EMIR?

The risk of systemic failure of energy derivative markets is small

The first question is answered by investigating the market failures of the market for energy derivatives in the current situation, i.e. in a market without EMIR. The principal purpose of EMIR is to increase financial stability, which points to systemic risk as the principal market failure of energy derivative markets. This study concludes that systemic risk does not occur on the energy derivative market; the risk of contagion and propagation of financial shocks on this market is much lower and in fact incomparable to the situation on financial markets. This study investigates the channels needed to propagate price shocks from energy derivative markets to the real economy. Derivative trading on energy commodity markets may cause price swings which are not in line with fundamentals and therefore increase volatility. In theory, this may impact the economy as a whole and have repercussions for real economic activity. However, our analysis shows that the extent to which price swings in energy derivative markets have this impact is very limited.

In addition OTC trading by the energy sector may have an effect on the real economy through an indirect channel which runs through the participation of financial institutions in energy derivative trading. However, the role played by financial institutions in this market is limited. They play a different and less active role in this derivative market, mainly due to the fact that they are not involved in the physical production and supply of energy. Contagion of financial instability via this indirect channel to other parts of the economy cannot be excluded, but the likelihood of it actually occurring is very low, given the limited scope of the activities of financial institutions in energy derivative trading.

It is important to note that hedging for the majority of the energy sector does not involve trading for speculative purposes. It must for a main part be seen as a regular part of the business process, which crucially depends on managing price changes in a market dominated by highly capital-intensive production and retail supply. The hedging of risk through futures and forward trading is a prime tool in securing the security of supply for energy consumers as well as maintaining the economic well-being of what is generally seen as a vital part of the economic infrastructure, the energy sector.

Moreover, a typical hedge for energy companies is to balance future production or consumption of energy by an OTC derivative. Opening a position on the OTC derivative market is often in fact closing a position in the broader energy supply chain, be it upstream or on the retail side of the market. The requirement of central clearing only covers one part of this chain, namely the derivative part, but overlooks the impact on the physical part of the energy market. A fully balanced position linking OTC trade to physical production may under EMIR require a substantial amount of cash collateral due to the requirement of central clearing.

Regulatory impact assessment points to small and uncertain benefits but potentially high costs
Regulatory impact assessment allows us to investigate the full range of economic effects brought about by EMIR. Possible benefits of EMIR emerge if compulsory central clearing manages to achieve its prime target: the reduction of the market failure caused by a perceived systemic risk on energy derivative markets. However, this positive effect is small due to the limited risk of financial instability in energy derivative markets spreading to other financial markets. The downside of this effect is the high cost of compulsory central clearing. Traders in energy derivatives will have to pay clearing fees and post substantially higher margins with clearing parties compared to current collateral posting. Higher costs of clearing may ultimately result in reduced market liquidity as market players have an incentive to prevent the extra cost by decreasing trading activity. This has the unintended effect of increasing the possibility of price shocks and a lower degree of competition in energy derivative trading markets. In this case EMIR pursues a self-defeating strategy and achieves the exact opposite of what it aims to achieve: to increase financial stability.

The second element of EMIR, reporting requirements, is primarily aimed at improving transparency or – in terms of market failures – in decreasing asymmetric information. This is essential for proper market functioning and an element currently lacking in OTC derivatives markets. Via its impact on transparency, the reporting requirement is also expected to contribute to financial stability and decreasing price shocks. However, other European regulation such as Remit (Regulation on Energy Market Integrity and Transparency) have comparable objectives. An important and yet unanswered question concerns the degree of overlap between EMIR, Remit and other parts of the energy regulatory framework. It cannot be excluded that EMIR implies excessive regulation on part of the transparency requirements. The consequence is additional costs for the energy sector, which mainly relate to the (additional) activities and (ICT) investments needed to provide the necessary information. As with central clearing, increasing costs might negatively impact on liquidity and the chance of price shocks, although these effects are not considered substantial.

In the context of this regulatory impact assessment the defining characteristic of an economic benefit or cost needs to be explained. The European Commission conducted an impact assessment of the proposal to regulate OTC derivatives. The impact analysis on the objective to increase the use of central clearing considers it a benefit that as a result of compulsory central clearing a reduction of counterparty risk is achieved. But from an economic point of view this cannot be listed as a positive welfare effect. A reduction of counterparty risk is only a positive welfare effect if a negative externality such as systemic risk is involved. In the current market energy companies optimize their trading stategy, which includes the choice to use a CCP or not. The decision to use a CCP depends on the investment strategy of the trader, his liquidity position, the credit rating of the counterparty, on the size of the counterparty, on the 'trust' built up in commercial practice between the energy firm and counterparty et cetera. If an energy company decides not to use a CCP, it involves a well reasoned decision based on financial and commercial arguments. The risk related to the exposure of such deals is what this firm considers a valid degree of commercial risk in relation to the expected profit of this deal. Without a connection of this risk to a systemic risk affecting the entire market, it is senseless to typify the reduction of counterparty risk as a benefit of regulation. By the same token, it is better termed a social cost, since it distorts the risk management process of trading firms and other corporations who use derivative trading as a hedging instrument for their business operations.

Welfare cost of EMIR is estimated to be circa € 2,4 to € 3 billion

The Impact Assessment of the European Commission compares different policy options but assesses the impact of these alternatives only in a qualitive manner. A cost-benefit analysis of policy proposals forms a more solid foundation for assessing the economic impact of those proposals. A cost-benefit analysis is a scientific instrument to assess the welfare impact of policy proposals. It is customary to use this instrument for markets linked to infrastructure like the energy sector. Key to a cost-benefit analysis is a structured assessment of the economic impact of policy proposals, isolating costs and benefits in terms of a common accounting unit, generally money.

For EMIR this study estimated the social costs and benefits to determine the overall impact on economic welfare in the Netherlands. The conclusion of this analysis is that for the Netherlands this welfare effect is negative with a magnitude of circa € 2,4 to € 3 billion. This conclusion is based on the calculation of the costs of compulsory central clearing to energy fims active in derivative trading. The costs of compulsory central clearing consists of fees needed for exchange and clearing. In addition credit cost and opportunity costs are made for the collateral deposited to cover the initial margin and mark-to-market (variation margin).

Confidential information from Dutch energy firms allowed us to estimate the costs of compulsory central clearing for the Netherlands-based operations of these firms. The costs are determined as the net present value of the cost difference with a continuation of the present regulatory framework without the obligation to centrally clear all OTC deals. This cost estimate is an underestimation of the actual impact. Derivative trading in coal, oil and carbon rights are excluded from the analysis due to a lack of data, but do form part of the trading activities of energy companies.

There are other social costs which are relevant for this cost-benefit analysis. This applies to the negative externality of the increased rather than reduced likelihood of price shocks are a result of a less liquid market. There is also a social risk involved in the focus on central clearing. What happens if a CCP defaults? The most likely scenario is that a CCP is too big to fail, just as is the case for the so-called systemic banks in the financial sector. Governments are likely to intervene to prevent a CCP from failing, shifting the welfare cost of this default to the taxpayer and society at large.

The costs of central clearing also depends on the possibility of netting exposure. This possibility is reduced if use is made of different CCPs. A calculation based on different numbers of CCPs shows that the welfare cost of central clearing may increase to circa € 4 to € 5 billion in case of 10 CCPs in the European market.

The costs incurred in central clearing have a counterpart which is the social benefit of the reduced likelihood of systemic risk in energy markets. This benefit cannot be estimated in an exact manner and is likely to be small. This explains why the sum total of social benefits and costs is dominated by the high cost of central clearing for energy firms.

A sensitity analysis provides insight in the robustness of the result. Hence the cost-benefit analysis was performed for different economic scenario's, a business-as-usual scenario (BAU) with continued growth of energy consumption and production and a scenario for the energy market based on active climate programs, promoting energy saving and therefore reduced volumes of trade in the energy market. The sensitivity analysis shows that the actual cost of central clearing depends on the scenario, but that the welfare cost remains substantial in either case.

The conclusion of this study is that the compulsory central clearing for energy derivative trading, which is part of EMIR, generates a high cost in terms of economic welfare but low social benefits and is for that reason better not implemented.

1 Introduction

Political interest in regulation and deregulation of markets often appears to follow the pattern of the tides, ebb and flow. Deregulation of financial markets set in motion a chain of events ultimately leading to a worldwide collapse of financial markets, following the bankcruptcy of Lehman Brothers in September 2008. The response of politicians, central banks and financial authorities has been predictable: tighter controls on financial markets are needed. The question is; what is the defining characteristic of a financial market and what should be the proper scope of such increased controls?

In Europe an effort is made to include the financial side of specific commodity markets in the re-regulation of the financial sector. Commodity markets have a physical and a financial side. The physicial side is the exchange of products like oil, grain or potatoes. The financial side is connected to the trade in futures and forward contracts. From an economic point of view such contracts are financial products, options specifying the sale or buy of a certain volume of physicial commodity at a future date for a specific price. The principal function of commodity derivatives is to hedge price risks. In theory, for any future or forward contract a risk-free position can be determined, implying that the price movement of the physical product will be exactly offset by the opposite price movements of the future or forward contract.

Forward contracts have historically played a natural role in energy markets. Energy is a highly capitalintensive market, requiring costly investments in generation (power plants) and transmission infrastructure (energy networks). Investors in this sector have a strong incentive to minimize the commercial risk of price changes. Forward contracts offer this option for both input and output markets. For example, the owner of a power plant may want to secure fixed prices for his prime production resources, coal, natural gas or biomass. Likewise energy retail companies aim to stabilize their selling costs by buying energy for a future period, when they lack own production facilities. The mirror image of this trade is the sale of energy for future periods, which offers security of output prices. Energy companies thus need to trade in derivatives to cover their risks and most of this derivative trading is historically done through the OTC market.

Derivatives of energy commodities are traded on exchanges like APX-Endex and OTC-markets. The difference between exchanges and OTC-markets is that on exchanges contracts are centrally cleared, but for OTC trade this is generally not the case. Following the G-20 Summit in Pittsburgh in 2009 OTC markets have become to aim of regulation to improve the transparency and stability of the financial system. This should protect investors and restore confidence in financial markets. To this purpose the G-20 stated that “[a]ll standardized OTC derivative contracts should be […] cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. […]”. This aim was taken over by the European Council and is currently developed via a set of directives and regulations for financial markets. One of the principal regulations of this set is EMIR, the European Market Infrastructure Regulation. This regulation is specifically aimed at OTC derivative markets and introduces amongst other things a reporting obligation for OTC derivatives, as well as a clearing obligation for eligible OTC derivatives. The Commissions proposal for EMIR is now under negotiation in the EU Council and Parliament.

According to the current proposal, energy markets will fall under the scope of EMIR, but very little is know about the impact of this regulation on this sector. Hence, the financial regulation has an impact well beyond the financial sector and there is immanent need to understand this broader impact of financial regulation. This report aims to investigate the impact of EMIR on the energy market, which is linked to the financial system via hedging operations of energy companies on the OTC market.

This report is commissioned by Energie Nederland, the representive organisation of the energy companies in the Netherlands. The chief aim of this study is to scientifically study the economic rationale of EMIR, which gives rise to the following set of research questions:

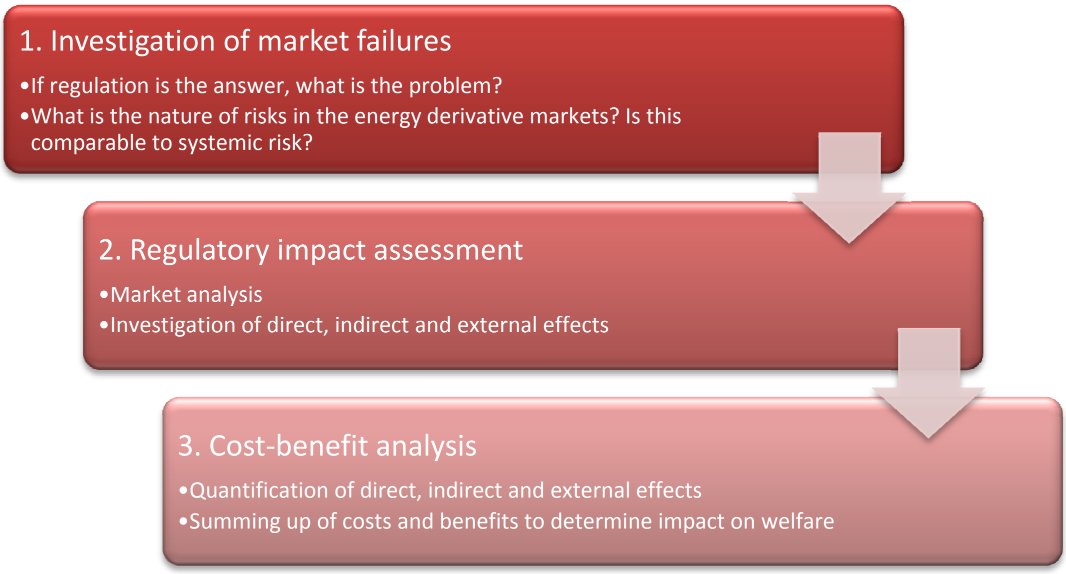
- *Rationale*: Why increase regulaton for energy commodity derivitative markets? Theoretically, regulation is aimed at correcting market failures. What are these failures in energy derivative markets and does the proposed regulation offer an effective solution?
- *Risks*: Of specific concern is the financial risk related to energy derivatives trading. Does this entail a systemic risk comparable to the banking/insurance sector?
- *Impact*: In case current proposals are implemented: what is the impact on energy firms and energy markets? The scope for assessing this impact is the Dutch economy, although it is clear that European elements need to be included since most energy firms operate on an European level.
- *Welfare*: From a social perspective, is financial regulation for energy derivative markets welfare enhancing? The aim of market regulation is to generate social benefits in the shape of improved functioning of markets, the mirror image of decreased market failures. But increased regulation is never costless. It distorts economic decisions of firms active in the regulated market and causes public spending by the need to monitor and maintain the regulation. If these costs exceed the benefits, then the cure may be worse than the disease

A further issue concerns the alternative solutions. Part of the scope of EMIR, for instance concerning the goal to improve transparency of derivative markets, is also coverd by the third EU package and other regulation such as REMIT (Regulation on Energy Market Integrity and Transparency). Is there overlap between the different parts of the European regulatory framework for the energy market? What are the alternatives to the requirement of central clearing? Currently, a balanced comparison of such alternatives is lacking.

This latter question is only briefly addressed in the present study. In particular it may be asked if amendments of the regulation produce a better result in terms of economic welfare, i.e. produce the same benefit at lower social costs. The answer to this question requires additional research which falls outside the scope of this report.

This study uses three instruments to investigate this set of questions. These are first of all the analysis of market failure(s) and the related microeconomic literature. Secondly, a regulatory impact assessment is needed to identify the direct and indirect effects of the proposed regulation. The impact assessment logically structures all effects and assesses their impact on the energy sector. Thirdly, an attempt is made to quantify this impact in a cost-benefit analysis (CBA). Figure 1.1 elucidates the different steps of this study.

Figure 1.1 Impact assessment of EMIR: a stepwise approach



2 Market failures in energy commodity derivative markets

There is little evidence for significant market failures in energy commodity derivative trading. In particular, the case for the existence of systemic risk in this market is not supported. This means that the economic rationale for the introduction of far-reaching regulation such as mandatory central clearing of OTC-contracts in energy derivative markets is found lacking.

2.1 Analytical framework

Economic regulation theory starts by addressing the rationale for government intervention. Think away the government and investigate the effects of unhampered market trading. In specific occasions the outcome of this free play of market forces produces negative and unintended results. They are termed market failures and may call for government regulation to redress them. Whether or not regulation is actually welfare improving is a subsequent step in the analysis. The first step is addressing the natue of possible market failures.

Economists mostly distinguish four types of market failure:

- *Public goods*. Public goods are nonrivalrous and nonexcludable. This means that the consumption of one unit of this good will not diminish the consumption opportunities of someone else. Nonexcludable refers to the impossibility of excluding consumers from enjoying this good, even when they do not pay for their consumption. Such consumers are called free-riders. Both characteristics explain that the free market will undersupply a public good. Increasing the supply of a public good will increase aggregate welfare. Most publicly supplied services (like roads and health care) are mixed or “impure” public goods: consumption can be rivalrous but exclusion may be costly.
- *External effects*: External effects are positive or negative spillovers caused by the decisions of an agent that affect the welfare of others without market interaction. As a result there is excess production of a good in case of negative externalities and undersupply in case of positive externalities. Examples of negative externalities on the energy market are pollution like CO_2, NOx, fine particles, exhaustion of natural resources and landscape pollution for example by wind mills. Examples of positive externalities are knowledge spillovers in case of investement in innovation.
- *Failure of competition* (increasing returns to scale and market power). In concentrated markets with a limited number of competing supplies, firms may have the ability to exploit market power by raising prices above marginal costs. If this occurs, the output is below the quantity that is welfare maximizing. A lack of competition may have several causes such the existence of niche markets and product variaties, the licensing a monopoly right by the government, or increasing returns to scale. The latter case occurs if production requires a large fixed cost for capital, know-how, or natural resource development. In a market with increasing returns to scale only a few companies will be active. They are able to use their market power to increase their profit.

- *Information asymmetry:* If market players do not have the same information, then market transactions will be characterized by asymmetric information. Two different problems can arise: moral hazard and adverse selection. Note that such market failures can sometimes be corrected by the market (for example if players can establish reputation) and do not require government intervention. In other cases information requirements issued by the government may solve problems.

Paternalism is a classic reason for government intervention which is unrelated to the analysis of market failures. Paternalism is that the government wants to increase or decrease the consumption of specific goods because this is deemed 'good' for the well-being of society. Redistribution of incomes and welfare is another reason underpinning government intervention.

Regulation is generally aimed to redress such market failures. This also occurs in the case of EMIR and other parts of the financial regulation aimed at OTC markets. The aim of this regulation is to reduce the negative externality of contagion in the global financial system. This externality points to the ripple effect of the global financial crisis of 2008, propagating economic shocks from financial markets to the real economy. Economists explain this negative externality in terms of "systemic risk", the ability of local shocks to propagete to the other parts of the economy. The proposed regulation such as Mifid and EMIR aims to curtail this systemic risk. But does this type of risk actually apply to the markets for energy commodity derivatives? This chapter aims to answer this question.

2.2 What is systemic risk?

During the 80's and 90's crises in the banking sector in Indonesia, Argentina and China have led to costs amounting to around 50% of gross domestic product of those countries (De Nederlandsche Bank, 2004). According to the IMF, the recent credit crisis had in mid 2009 already resulted in ten thousand billion dollar of support actions by governments, of which 1100 billion dollar direct capital injections in financial institutions; and this is without taking macro-economic costs in terms of e.g. lower GDP-growth into account. Even if part of injections will flow back to governments when selling their stakes in the institutions, costs are enormous.

These examples refer to the risk that problems of financial institutions impact the entire financial system and in consequence the real economy. This risk is generally referred to as systemic risk.

Systemic risk as a market failure
Risk is part of everyday life, and surely for companies. Risk has a price and companies are free to decide to what extent they want to bear risk or not and at what price. Risk in itself is not a market failure and eliminating risk as such should not be the objective of regulation.

When companies bear risk, they expose themselves to positive or negative outcomes relative to the long term average of financial returns. In case of systemic risk, there is an asymmetry in the distribution of the outcome: companies bear the full fruit of positive deviations, but do not pay the full price of negative deviations. This is called a negative externality: prices do not reflect the full cost to society[1] – the price here being the impact of problems of financial institutions on the real economy. This results in socially excessive risk-taking with potentially great costs to society. Systemic risk is therefore a market failure that can merit government intervention and regulation.

Definition and scope

Although systemic risk is an essential part of the debate on financial regulation, work on understanding the economic fundamentals underlying this type of risk and even coming to a widely accepted definition is still in an early stage.[2] This is also something policymakers are struggling with, as they face the widely recognized need to act against systemic risk.[3] Here, we will follow Anabtawi & Schwarcz (2011), defining systemic risk as "the risk that a localized adverse shock, such as the collapse of a firm or market, will have repercussions that negatively impact the broader economy".

This definition does not include a specific reference to financial institutions or markets. Still, systemic risk is mostly discussed in the context of the financial sector. Indeed, all classical examples of systemic risk – from the Great Depression to the recent credit crisis – relate to problems in the financial sector. This is by no means accidental: the function of financial intermediaries (mostly banks) is intermediation between parties looking for money and parties offering money, thereby transforming it in terms of place, volume, time and risk, positions them as key players within the economic system. In other words: the link between the financial sector and the real economy is intrinsic to the economic function of financial intermediaries and turns them into the most logical starting point for fighting the consequences of systemic risk. The definition of 'the' financial sector, however, has become more and more fluid over the years. Mainly due to financial innovation banks do not have the sole right on the concept of financial intermediation anymore. Together with the development of disintermediation, this implies a broader definition of the financial sector in relation to systemic risk.[4] The recent crisis has added new elements to this discussion, including (financial) markets in the concept of systemic risk, as described by Jouyet (2010): "[t]he risk of a failure by a financial institution has now been joined by the risk of a major market malfunction or stoppage. This issue is made more pressing because in a mark-to-market environment, the entire economic sphere relies on the prices supplied by markets".

2.3 Systemic risk and the OTC derivatives market

Derivative markets have played a key role in the systemic wide contagion of financial problems during the recent credit crisis. Structured products based on mortgages (Mortgage Backed Securities, MBS) were an essential driver for credit growth, risk taking, complexity and intransparancy of underlying risks – and a fire starter for the crisis. Credit Default Swaps (CDSs)[5] have proven to be another pivotal facilitator of contagion. CDSs were bought by parties to insure

1 Also referred to as 'tragedy of the commons'.

2 See for instance Schwarcz (2008) and Eijffinger (2010) for an overview and analysis of definitions and Anabtawi and Schwarcz (2011) for an elaborate analytical framework.

3 As Eijffinger (2010) states "[h]owever, the ECB does not have a clear concept of systemic risk itself and even in the academia there exists no generally accepted definition".

4 The scope of recent regulation, like CRD and Mifid, includes for instance 'credit institutions' and 'investment firms'.

5 Financial instruments providing insurance against the default of a borrower.

against default on MBSs. Once the MBS market turned sour, major insurance companies could not deliver on their obligations, further exacerbating the contagion throughout the financial system.[6]

Most of derivatives are traded Over The Counter – that means bilaterally between counterparties instead of via organized exchanges. Transparancy of these transactions is low for parties other than the counterparties, as is insight in the quality of risk management and the related (remaining) system risk. Former president of the Dutch Central Bank, Nout Wellink (2010) concludes "[a]lthough derivatives have contributed to financial innovation and market efficiency, the past years have also demonstrated that these markets are capable of exacerbating financial distress…Consensus exists that OTC markets have to become safer, more resilient, and more transparent".

The European proposal for a regulation on OTC derivatives, central counterparties and trade repositories, is explicitly aimed at decreasing systemic risk. Although the Impact Assessment by the EC (EC, 2010, Impact Assessment) initially referred to counterparty credit risk and operational risk as such, the proposal for legislation by the Council states "[e]nsuring that the clearing obligation reduces systemic risk requires a process of identification of eligible classes of derivatives that should be subject to that obligation" (Council of the EU, 2010, Proposal for a regulation…) while the amendments by the EP to the draft proposal state even more clearly "[i]n determining whether a class of derivatives is to be subject to clearing requirements, ESMA should aim for a reduction in systemic risk and avoidance of systemic repercussions" (EP, 2011, Report on the proposal for…).[7]

2.4 Systemic risk and the energy sector

The broadening of the relevant scope for systemic risk, as discussed in the previous section, has also opened the door to the inclusion of other sectors than the financial sector in the regulatory discussion. Parties that participate on relevant financial markets or use relevant financial instruments could be included in the scope for regulation on the basis of systemic risk. In this context, the proposal for OTC legislation states "[w]here appropriate, rules applicable to financial counterparties, should also apply to non-financial counterparties..." (Council of the EU, 2011).

There are two complications in determining the scope of analyzing the 'appropriateness', which most logically refers to the systemic risk posed by the non-financial counterparties. First, the question is whether systemic risk requires a link between the relevant non-financial sector and the financial sector. If the focus is on the impact on the real economy, repercussions of e.g. defaults

6 Leading for instance to the bail-out of AIG.

7 In the Council's version of June14th 2011 – that is: after the report with proposed amendments by the EP – the text has been changed to "[w]hen taking into account what classes of derivatives should be subject to the clearing obligation, ESMA shall pay due regard to wider relevant criteria, most importantly the impact on systemic risk in the financial sector, counterparty credit risk, and regarding the timeframe, the impact on competition in the Single Market" (Council of the EU, 2011). This could imply the use of wider criteria than systemic risk alone. In the view of the writers of this report counterparty credit risk alone cannot be a reason for regulation, as risk as such does not constitute a market failure. It is therefore assumed that the Council here refers to counterparty credit risk in relation to the concept of systemic risk.

by non-financial firms could be relevant even if there is no impact on or via the financial sector. In this regard, IMF et al. (2009) state that "[t]he interpretation [of what is systemically important], however, is nuanced in that some authorities focus on the impact on the *financial system*, while others consider the ultimate impact on the *real economy* as key". At the same time, IMF's definition of systemic risk is specifically limited to a disruption of *financial* services: "[a] systemic event should be contrasted with more general wealth effects that may have severe macroeconomic consequences but are not associated with the impairment of the financial system". This discussion is also evident in the various versions of the proposed legislation of OTC derivatives, sometimes referring to 'systemic risk' and sometimes explicitly to 'systemic risk in the financial sector'. To be absolutely sure that every possible criterion to regulate OTC derivative commodity trade by the energy sector is analyzed, both types of impact are included in the scope.

A second complication is whether the question of systemic importance refers to the energy sector as a whole or to specific markets on which energy companies are active. Conceptually, every sector could include institutions that are systemically important due to their potential impact on the financial and/or the real economy. Yet, the regulation is specifically focused on the OTC derivatives market – for energy companies this is relevant as they are active on OTC commodity derivative markets. The most recent version of the proposed legislation indeed seems to point to the second option: "…the Commission shall assess the systemic importance of the transactions of non-financial firms in derivatives in different sectors, including the energy sector" (Council of the EU, 2011). Here, focus will be on OTC commodity derivatives trade by the energy sector.

Before turning to the question whether systemic risk is relevant for OTC commodity derivatives trade by the energy sector, the next section addresses the question when an institution, instrument or market poses 'systemic risk' or can be marked as 'systemically important'.

2.5 Measuring systemic risk and systemic importance

Designing regulation to contain systemic risk asks for a clear definition of the relevant scope: where in the space between stand-alone company risk and risks threatening the wider real economy should the regulator step in? Policymakers and scientists try to tackle this issue by defining measures/indicators for 'systemic risk' and 'systemic importance'. Below, an overview of influential papers on this subject is presented with the goal of identifying reference points for the related question relevant in the context of this research: when can a non-financial institution be identified as imposing systemic risk, including but not necessarily limited to its activities on the OTC (commodity) derivatives market?

IMF et al. (2009) define three criteria to assess whether an institution, market or instrument is systemically important: size, lack of substitutability and interconnectedness. These "key functional characteristics" could be scored qualitatively and/or quantitatively in an assessment framework.[8] The paper explicitly provides *guidance*, and does not provide a clear-cut definition of when an institution or market would be deemed systemic. In addition, (quantitative) indicators

[8] An interesting point is the potential use of network analysis – relevant because the impact of the energy sector could partly result from contagion towards the financial sector. Most of the literature on this subject, however, has focused on interbank credit markets.

are mostly defined in terms of activities of financial institutions – like "the volume of financial services provided through clearing and settlement" and "financial intermediation" as measures for size. The paper therefore does not provide practical answers to the question whether and when non-financial institutions can be qualified 'systemic'.

BIS (2011b), which focuses on the assessment of *global* systemically important banks, defines similar criteria as IMF et al. (2009).[9] Though the 'global' aspect is outside the scope of this research, the paper offers a slightly more detailed description of potentially interesting indicators. Again, most activities in the scope of the paper are not relevant for non-financial institutions – simply because most activities relate to intermediary services. An exemption in the context of this research is the indicator 'net mark to market OTC derivatives with financial institutions'. Non-financial institutions could have OTC derivatives positions with financial institutions, thus representing interconnectedness with the financial sector and potentially posing systemic risk.[10]

The paper proposes to calculate a score for this indicator based on the intra-financial OTC derivative positions of a bank relative to the total intra-financial positions. This way of scoring – resulting in an overview of relative positions – implicitly starts from the assumption that financial institutions impose systemic risk and that the main question is which institutions impose the biggest systemic risk. Although this is logical within the given policy context of the BIS paper, it is not helpful in answering whether and when a non-financial institution imposes systemic risk. In the description of 'ancillary indicators', 'gross mark to market OTC derivatives transactions' is introduced to capture a bank's importance in view of the functioning of key asset (and funding) markets.[11] Again, this is measured relative to other global banks and not usable in the context of this research as such. However, the question could be broadened to the importance of (non-financial) institutions in specific financial markets, even if the transaction volume of financial institutions in these markets is not substantial. If a disruption of a financial market harms financial institutions via interconnections with other financial markets, this would merit the question whether there are (non-financial) institutions whose failure could disrupt that financial market and thus (via other financial markets) the financial system.

An interesting point in the IMF et al. (2009) paper, is the potential use of network analysis. Most of the literature on this subject, however, has focused on interbank credit markets. An example of this is BIS (2011a), which measures the systemic importance of interconnected banks by focusing on a bank's contribution to systemic risk in the presence of an interbank network. The starting point of the *contribution* approach, in contrast to the *participation* approach, is that the role of banks in systemic risk is not merely through losses that have an impact on non-banks but also through their impact on the probability and severity of losses by other banks in systemic events. It is not difficult to see a parallel with one of the arguments used for regulating the OTC derivative markets – and especially in the context of the energy sector – namely its potential impact via contagion towards and between financial institutions. However interesting, literature

9 Additional criteria in this paper are: an indicator for the global footprint and an indicator for the complexity.

10 Another indicator which seems interesting at first sight, is 'OTC derivatives notional value'. However, this indicator is used as a measure for 'complexity'. That is, the starting point is that financial institutions impose systemic risk and that the greater its complexity, the greater the costs and time to resolve a bank. This does not shed light on *whether* an institution is systemically important.

11 The ancillary indicators are meant to support potential judgmental adjustments to the indicator scores.

on this subject so far is mostly focused on the specific elements within the financial sector itself and is therefore not (yet) usable in a practical definition of 'systemic' in the context of this research.

Acharya et al. (2009) and Acharya et al. (2010) use Systemic Expected Shortfall (SES) as a measure for systemic risk, which they show to be equal to "the expected amount a bank is undercapitalized in a future systemic event in which the overall financial system is undercapitalized".[12] They conclude SES is measurable and related to a firm's "losses in the tail of the aggregate sector's loss distribution" (which they denote as Marginal Expected Shortfall, MES) and to its leverage. They then find that MES and leverage are indeed good predictors for each firm's contribution to a crisis. The authors focus on externalities from the financial system towards the real economy, materializing when aggregate capital of financial institutions drops below a certain level. By explicitly taking the financial system, and its specifics, as a starting point their analysis is not appropriate for measuring systemic risk in the context of this research.

Adrian and Brunnermeier (2010) take the concept of Value at Risk, a measure of risk commonly used by financial institutions, as a starting point to measure systemic risk. They denote CoVaR as "the value at risk of the financial system conditional on institutions being under distress". The difference between the CoVaR of an institution in distress and the same institution in a 'normal' state, ΔCoVaR, then "captures the marginal contribution of a particular institution…to the overall systemic risk". The authors propose to link financial regulation not to CoVaR directly but to indicators predicting CoVaR – specifically: size, leverage and maturity mismatch. It is not unthinkable that this way of thinking could shed light on whether, and to what extent, non-financials like energy companies contribute to systemic risk, but results so far are based on data of – and are thus predominantly usable for – financial institutions.

This short summary of views on systemic risk and systemic importance from both academics and policymakers is not meant to be exhaustive. It does, however, include some of the most recent influential papers on the subject and sheds light on some general conclusions in relation to the question stated at the beginning of this section: when can a non-financial institution be identified as imposing systemic risk including, but not necessarily limited to, its activities on the OTC (commodity) derivatives market? So far, the analysis of 'systemic risk' and 'systemic importance' is highly conceptual in nature – addressing the (kind of) indicators that can be used to identify 'systemic importance' – and mostly specifically focused on banks or at its best on the broader range of financial institutions, instruments and markets. Some elements are interesting for the question of systemic importance of the OTC derivative trade by the energy sector, but require further investigation to say the least. This is clearly outside the scope of this research. *More importantly at this stage, is that there do not seem to be theoretical or practical methods available yet to policy makers to unambiguously determine, based on qualitative or quantitative indicators, whether (or: when) OTC derivatives trade by non-financial institutions poses systemic importance risk*. What is left is a more conceptual discussion: *could* trade in the OTC commodity derivative market by the energy sector pose systemic risk and has this materialized in the past? The next two sections discuss the potential direct and indirect contagion impact respectively.

12 More specifically, this is the systemic-risk component within SES, which also refers to the expected default loss relevant for externalities in terms of creditor protection.

2.6 Direct impact on the real economy

As explained above, the function of (mainly) banks as financial intermediaries – thereby being a conditio sine qua non for funding of consumption and investments of many of economic participants – implies a close relation with the real economy. In other words: a disruption of this function has direct impact on activities in the real economy. This puts financial institutions at the centre of the systemic risk discussion and the impact of other sectors is therefore mostly discussed in terms of indirect contagion *via* the financial sector. Still, this does not mean that other sectors could not have a direct disruptive impact on the real economy.[13] Indeed, it is not unimaginable that the energy sector – supplying essential input factors to almost every part of the economy – could have such an effect in case of company failures or a broad market breakdown. Especially so in the context of this report, where energy sector activities are discussed within the framework of a financial market. This section discusses the potential direct impact of OTC commodity derivative trading (by the energy sector) on the real economy.

This potential direct impact generally operates via the price mechanism. Extreme high prices and volatility will put a burden on the economy. Consumers and producers face higher food, gasoline and electricity prices. Production and investment has to adjust to the higher energy prices, which takes time and reduces growth. Higher prices will result in higher inflation, which can also have negative effects on the economy. The increased volatility caused by price shocks increases uncertainty, which increases price risks for many producers, ranging from farmers and mining companies to automobile manufacturers and airlines. Uncertainty therefore reduces investments, which reduces jobs and economic growth (Hamilton 2009).

Price shocks can occur for a number of reasons, such as a political crisis (for example, Iraq's invasion of Kuwait in 1990) or natural disasters (e.g. Hurricane Katrina in the US in 2005). Another possible cause of price shocks might be the activity of speculators on energy derivative markets. The oil price shock of 2007-2008 has been ascribed by many commentators to the activities of financial firms who speculated on the commodity derivatives market. The costs of adjusting to the oil price spike could then be seen as a negative external effect of the activities of the speculators. In that case, there would be a reason for government regulation targeted at reducing the risk of speculators causing price shocks as long as the benefits of such regulation in terms of reduced damage from possible price shocks would outweigh the cost of regulation.

Bankruptcies of large energy firms might in theory also affect energy prices. Following the failure of Enron, several studies have analysed the effect of the Enron collapse on price volatility in energy markets (see Appendix). Pindyck (2004) has looked at volatility on the natural gas and oil market in the period 1990-2003. He did not find any statistical evidence that the failure of Enron has increased price volatility. The fall of Enron did not only have no effect on price volatility, it also did not affect price levels in any significant way (Electric energy online 2003). The energy

13 As also follows from the earlier stated definition of systemic risk, i.e. "the risk that a localized adverse shock, such as the collapse of a firm or market, will have repercussions that negatively impact the broader economy" (Anabtawi & Schwarcz, 2011).

trading industry itself however *was* affected. Credit ratings of energy traders were downgraded and a number of firms left the market (Brunet and Shafe, 2007).

However, first of all the question has to be answered whether speculators can indeed cause price shocks on energy markets. There has been much discussion about the role of speculators in the recent oil price shock of 2007-2008, ranging from commentators to a growing body of scientific literature. The main argument advanced by the proponents of the belief that speculators drove up the prices is the large increase in speculative positions in commodities markets in 2007-2008. However, financial activities do not necessarily lead to price shocks (see Lombardi and Van Robays, 2011). As long as non-commercial trading reflects expectations based on the fundamentals of the energy market, the efficient functioning of the market is not distorted. Instead, price formation is improved because new information regarding expected fundamentals is provided. Financial activity will only be destabilizing when it is not based on fundamentals. For example, financial firms might enter the market in order to diversify their portfolio, without regard for the fundamentals. Commodity-related index funds only entered the long side of the crude oil market in 2007-2008, independent of whether the future expectations on demand and supply where strong or weak. This might have caused the price to deviate from levels justified by the fundamentals.

To answer the question whether speculators had a role in the 2007-2008 oil price shock, we therefore first have to look at the fundamentals of the oil market and consider if the financial activities where in line with these fundamentals or not. The fundamentals of the oil market are defined by supply and demand. Supply in the run-up to the 2007-2008 oil price shock was remarkably stable (Hamilton 2009). There was no reduction in supply, but also no increase. The most remarkable fact about this period was that Saudi Arabia's production was not increased when prices rose. Up until the late nineties, Saudi policy was to adjust production to stabilize prices. However, they subsequently abandoned this policy, allowing prices to soar without increasing their production. The reason for this policy change is not clear. Their spare capacity might have been insufficient to adjust production or it might have been a deliberate policy. Whatever the reason, the consequence has been that any disturbance to demand or supply has had a much larger effect on prices than before.

On the other side of the market, demand for crude oil has shown a strong increase, particularly in China where oil consumption has increased at a 7 percent compound annual rate since 1990. World oil consumption in 2005, at 85.5 million barrels a day, was 5 million barrels per day higher than in 2003. Given the strong growth in real gross world product in 2006 and 2007 of an additional 10.1 percent , demand might have been expected to have increased by 5 mbd more if there had been no increase in prices (Hamilton 2009). The shift in demand could not be met by short-run increases in production, therefore prices had to increase to match demand with the available supply. Therefore fundamentals are a major explanation of the oil price increase up to 2008.

Does this exonerate speculation from its perceived crime of driving up the oil price in 2007-2008? Not necessarily. One can conclude that fundamentals have played a major part, but financial activity might still have contributed to the price shock, driving up the price above the level justified by fundamentals. Lombardi and Van Robays (2011), among others, have compared the role of fundamentals with the role of financial activity. They conclude that in the period 2000-mid 2008, financial activity in the futures market drove the oil prices about 15 percent above the level justified by fundamentals. Destabilizing financial shocks in particular magnified the volatility in the oil market in 2007-2008. However, they also note that the major drivers of the oil price were demand and supply shocks.

It is important to note that a possible misalignment of prices due to financial activity can only be sustained for a short period. The reason for this is that movements in (future) oil prices will have an effect on the physical side of the market. An increase in prices will eventually have an effect on demand for oil products such as gasoline. In the longer run, the effects will be even larger, with adjustments such as a shift to more energy efficient cars. This was the case in the US in 2007-2008, where the sale of Hummers collapsed in favor of small, efficient cars. Therefore, a possible destabilising effect of financial activity on prices can only be temporary.

The main research into financial activity and energy prices has so far be confined to the oil market. Electricity and gas markets, where most of the trading of EU energy companies takes place, have been far less researched. One of the reasons for this lacuna is that the role of financial firms on these markets has been far more limited. The large influx of capital, which took place on the oil derivative market, has not been matched by a similar entry of financial firms on power and gas markets. The Dutch regulators NMa and AFM mention in a recent quick scan of the role of speculators and hedge funds in price setting of TTF's (NMA and AFM, 2011), that there is little activity from speculators and hedge funds up till now. Moreover, trading on these markets requires specific knowledge, which poses an entry barrier for financial firms.

The main conclusion is that financial activity on oil derivative markets might temporarily force energy prices to depart from the efficient price based on fundamentals and therefore increase volatility. Their activity could therefore have a negative external effect on the economy, because energy price shocks and volatitily will hamper economic growth. However, the extent to which financial activity can cause price shocks appears to be limited, both in size and in time.

This points at the absence of systemic risk in the case of oil derivative markets and *pari passu* comparable energy commodity derivative markets such as power and natural gas. It is therefore important to compare the costs of regulation which might reduce the possibility of financial activity causing price shocks on energy markets with the size of the expected benefits. This shall be done in Chapter 6.

2.7 Indirect impact via the financial sector

In addition to potential direct impact, OTC commodity derivative trading (by the energy sector) could also have disruptive impact on the real economy indirectly, via the financial sector. The question here is whether there are links from the commodity markets, or its participants, to the financial sector - potentially channeling disruptions through the financial system towards the real economy.

2.7.1 Credit and equity risk

Financial institutions have a relationship with participants on the commodity derivative market aside from trade on the market itself. That is, they provide credit or equity to participants, resulting in credit and equity risk. In case a participant fails on its credit obligations or goes into bankruptcy, financial institutions can be harmed. Whether, and if so to what extent, this constitutes systemic risk depends on the financial quality of the participant(s), the (relative) exposure of the financial institution(s) on the participant(s) and the systemic importance of the financial institution(s). Essentially, this can be assessed in the same way as would be done for financial exposure on other companies and/or sectors.[14]

2.7.2 Counterparty credit risk – direct exposure

Financial institutions act as participants on the OTC commodity derivative market. This means that they enter into positions in which they run the risk that a counterparty cannot deliver on the transaction. Counterparty credit risk refers to the risk that a contract has to be replaced if the counterparty defaults. Whether, and if so to what extent, this constitutes systemic risk depends on the financial quality of the counterparty, the potential to replace the deal in case of default, the (relative) exposure of the financial institution on the counterparty and the systemic importance of the financial institution. In addition, it should be taken into account whether participants are counterparty to many financial institutions at the same time as well as the probability that the default of one participant results in the default of many participants – both would increase systemic risk.

Normally, financial institutions check their counterparties on default risk and mitigate risks to an acceptable level. First of all, problems can arise if risks are not identified and/or properly assessed. In the OTC derivatives market, risk identification and assessment can be hampered by the fact that OTC counterparties often have positions in (many) other OTC transactions. Due to the low level of transparency in this market, assessing the net default risk of a counterparty may prove difficult.

Another potential problem is that the level of risk acceptance by financial institutions can be too high. In commercial practice risks are assessed on the basis of rational arguments like cost efficiency or profit maximization. This does not exclude that financial institutions invest in opportunities which are too risky from a societal point of view. This is the key point of negative externalities: part of the risk is not born by financial institutions but by society due to potential contagion from bank failure towards the real economy. Financial institutions do not include the costs of this spillover to other parts of the economy in their commercial assessment of risk taking. As a result, they assume a too high level of risk in their commercial undertakings.

These problems are only of importance from a systemic risk point of view if materializing would imply contagion towards the real economy. For this, one or more financial institutions must at least have a substantial exposure in the OTC commodity derivatives market compared to their other activities. Chapter 4 shows that the OTC commodity derivatives market amounts to circa 1% of total OTC derivatives market – and the share of energy commodity derivatives account for

14 See for instance: CESR and CEBS (2008).

a fraction of this percentage. Based on interviews and data from Dutch energy companies, the share of financial institutions as counterparty in OTC energy commodity derivative transactions amounts roughly to 10-30%.[15] Though providing only a rough estimate of the potential (relative) size of positions of financial institutions in OTC (energy) commodity derivative transactions, it is reasonable to assume that these activities constitute only a small fraction of total activities of financial institutions. Evidently, this does not suffice for financial regulators. They aim to rule out any possibility that the activities of financial institutions may give rise to some kind of systemic risk, now and in the future. For now, the lack of transparency prevents a clear view on positions of financial institutions and thus on the exact degree of systemic risk in commodity derivative markets like energy.

2.7.3 Counterparty credit risk – indirect exposure

In addition to the direct exposure to counterparty default risk, financial institutions might be subject to indirect exposures. Failure of players in the (energy) commodity derivatives market can result in price and spread movements and thereby impact financial institutions having invested in these markets. Consequences would even be more pronounced if failures would result in broader confidence and liquidity drops. Interdependence between failure of players in the (energy) commodity derivatives market and the wider financial system could thus imply systemic risk. Obviously, this is true for any sector financial institutions invest in. Lack of transparency, however, prevents proper insight in the actual risks born by financial institutions.

Financial institutions can also have exposure to the same (energy) commodity firms in other types of derivatives, like FX or interest rate. Failure of commodity firms may then have impact on financial institutions notwithstanding small positions in (energy) commodity derivatives. It does not seem appropriate, however, to design regulation focused on commodity derivatives to tackle this problem.

The Appendix to this study discusses three bankruptcies of large companies active in energy trading. The consequences for other energy firms and the financial system appear to have been limited. Experience so far seems to imply that even when big energy trading companies fail, neither direct nor indirect exposure channels result in contagion. The explanation of this fact is that the links between such energy companies and financial institutions are of minor importance compared to the interlinkages between financial companies themselves. The international financial system is so vast that the bankruptcy of an energy (trading) firm is a mere drop in an ocean of financial activity. So the economic consequence of such bankruptcies are felt by financial firms but do not affect the economic well-being of the financial community at large.

In addition to the potential impact of *failure of counterparties* (like energy companies) on financial institutions' financial positions, there is also potentially systemic risk stemming from the reverse risk position. The financial crisis pointed to the risk that derivative markets may worsen the financial position of financial institutions already in distress, to an extent unimaginable before. It were the actions of counterparties as a reaction to the weakening position of financial institutions – completely rationale within the mechanisms of derivative markets – that acted as (additional) sparks to set the financial markets on fire. A first example is the bail-out of AIG. AIG's

15 With financial institutions primarily referring to banks.

subsidiary, AIG FP, suffered major losses, causing AIG's credit rating to drop, automatically triggering the demand from its counterparties to post additional collateral on its CDS positions. AIG was not able to meet these obligations and was finally bailed out by the US government. A second example is Bear Stearns, whose worsening financial position caused its derivative counterparties to reduce exposures on Bear Stearns. This in turn led to a withdrawl of cash collateral posted by its counterparties and thereby to a reduction of liquidity that Bear could not bare – finally accelerating its failure. In addition, the failure of big dealers to the likes of Bear and Lehman Brothers, counterparties had to move substantial derivative positions to other dealers, "causing severe pressure on a range of financial markets" (Duffie, 2009).[16]

Again, the actual (potential) impact of indirect exposure on systemic risk is highly influenced by the relative exposure of financial institutions and its systemic importance. As stated, the exact positions of financial companies in energy derivative markets are not clear due to a lack of transparency, but the information at hand points at relatively small positions indicating a limited possibility of systemic risk through indirect channels.

2.8 Concluding remarks

Economists judge whether or not regulation is welfare improving based on the extent to which markets result in an optimal allocation. If market failure occurs regulation can in theory be welfare improving for that specific market. Economists generally distinguish between four types of market failure: public goods, external effects, failure of competition and information asymmetry. This chapter focuses on systemic risk, as the external effect that primarily supports the current proposals for regulating OTC-markets. The question therefore emerges whether systemic risk also applies to specific commodity derivative markets such as energy derivatives.

Based on Anabtawi & Schwarcz (2011), systemic risk is defined as "the risk that a localized adverse shock, such as the collapse of a firm or market, will have repercussions that negatively impact the broader economy". It is important to note that risk is part of everyday (business) life and that regulation should not be aimed at abolishing risks. Only when risks pose an unpriced threat to the wider economy, it can be defined as a negative external effect which may call for government intervention. Here, it is analysed whether trading on OTC energy commodity derivative markets (by energy companies) constitutes systemic risk.

The first way to look at this question is to identify when trading on OTC commodity derivate markets by energy companies could be identified as imposing systemic risk. A review of some of the most recent influential papers on the subject of 'systemic risk' and 'systemic importance' shows the analysis so far is highly conceptual in nature and mostly specifically focused on banks or at its best on the broader range of financial institutions, instruments and markets. As such, currently no theoretical or practical methods are at available to policy makers to unambiguously determine when OTC derivatives trade by non-financial institutions poses systemicly importance risk. What is left is a more conceptual discussion: can trade in the OTC commodity derivative market by the energy sector pose systemic risk and has this materialized in the past?

16 It is questionable whether clearing obligations would have prevented these developments: better risk management requirements seem more appropriate.

There are two channels that in theory may enlarge the impact of regular market risk to become a a systemic risk, impacting the broader economy. These are a direct and an indirect channel. Direct impact refers to contagion from the energy sector directly to the real economy. Developments in the energy sector – supplying essential input factors to almost every part of the economy – could in theory have an adverse impact on the real economy. Primary examples of such developments are company failures and energy price movements. A review of company failures of large energy companies shows that historically there is no evidence for a negative and self-propagating impact from failures on the real economy. In terms of price movements, the extent to which financial activity can cause price shocks appears to be limited based on financial activity on energy derivative markets, both in size and in time.

Indirect impact stemming from OTC commodity derivative trading by the energy sector refers to contagion via the financial sector towards the real sector. In theory the credit and equity positions of financial institutions in the energy sector are able to cause financial distress in case of failures of energy companies. This study concludes that this is more logically regulated on the level of the financial institution itself. In view of this research, it is more important that energy derivative trade positions of financial institutions towards energy companies pose risks. This is called counterparty credit risk, which again has a direct and an indirect element. A position on an energy company might imply a direct risk, when the counterparty fails to deliver on the obligations of the derivate. In addition, defaults can cause market or price movements that impact financial institutions – implying an indirect counterparty credit risk effect. In this light, it is important to note that there is also a reverse indirect effect: financial distress of a financial instution itself might cause its counterparties to act in a way that worsens the financial position of the financial institution, e.g. by demanding additional margin or switching to other traders, thereby propagating market risks. It is exactly this risk that played an important role in the recent financial crisis. Whether counterparty credit risk, direct or indirect, results in systemic risk primarily depends on the relative exposure of financial institutions and its systemic importance. Due to a lack of transparancy, for energy derivative markets the exact positions of financial institutions are not clear but the information at hand points to relatively small positions.

Based on the analysis so far, it can be concluded that the direct systemic risk channel seems of no significant importance for the energy sector. Financial companies play a different and less active role in this derivative market than energy companies, mainly due to the fact that they are not involved in the physical production and supply of energy. Contagion of financial instability via this indirect channel to other parts of the economy cannot be excluded, but the likelihood of it actually occurring is very low, given the limited scope of the activities of financial institutions in energy derivative trading.

After a thorough review of the relevant regulation (Chapter 3) and insight into the characteristics of the energy derivative trading market (Chapter 4), these conclusions and its consequences are further discussed and put into context in Chapter 5.

3 Financial regulation for the energy sector

Which new regulations shall apply to firms trading at the energy derivative market? This chapter focuses on the consequences of EMIR and CRD requirements.

3.1 Introduction

The European Union intends to implement several new financial regulations and revise existing regulations as a response to the financial crisis. Table 3.1 summarizes the relevant new or revised regulations that may impact the energy derivative market.

Table 3.1 Relevant European financial regulation development for the wholesale energy market

Directive/Regulation	What	Financial/ Energy	New / Revision	Planned date
REMIT	Market integrity and transparancy	Energy	New	Late 2012
EMIR	Market Infrastructure legislation	Financial	New	Late 2012
MAD II	Market abuse	Financial	Revision	2013
MiFID II*	Regulation financial instruments	Financial	Revision	2013
CRD IV	Capital Requirement	Financial	-	-

* According to the latest proposal, MiFID shall be split into a directive (MiFID II) and a regulation (MiFIR)
Source: SEO Economic Research

As this report is concerned with systemic risks in the energy wholesale market, it focuses on the regulations that are directly aimed at mitigating these risks. These are:

- the Regulation of the European Parliament and of the Council on OTC derivatives, central counterparties and trade repositories (EMIR) and
- the Capital Requirement Directive (CRD). The main consequences of EMIR and CRD for wholesale derivatives markets are summarized in the Leaders' Statement of the Pittsburgh G-20 summit in September 2009:

'*All standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through central counterparties by end-2012 at the latest. OTC derivative contracts should be reported to trade repositories. Non-centrally cleared contracts should be subject to higher capital requirements.*' (Leaders' Statement The Pittsburgh Summit, p. 9).

EMIR obliges clearing through central counterparties for certain classes of derivatives whereas the capital requirements aim at providing incentives for clearing by setting higher capital requirements for non cleared OTC derivative contracts.

This review of the financial regulation interprets the proposed regulation from the perspective of the European legislator. The aim is to provide clarity, given that a lack of clarity reduces the effectiviness of the regulation and increases the social costs of what the regulation aims to achieve.

3.2 EMIR

Introduction

At the time of writing this report, EMIR[17] still is in the legislative process. The latest Council document dates from June 14, 2011. This document is used to appraise the significance of the legislation for firms trading in gas and power derivatives.

Goals of EMIR (Pretext)

The goals of EMIR are twofold as mentioned in the pretext to the regulation:

Pretext 4): '*Over the counter-derivatives lack transparency as they are privately negotiated contracts and any information concerning them is usually only available to the contracting parties. They create a complex web of interdependence which can make it difficult to identify the nature and level of risk involved. The financial crisis has demonstrated that such characteristics increase uncertainty in times of market stress and accordingly, pose risk to financial stability. This regulation lays down conditions for mitigating those risks and improving the transparency of derivative contracts.*'

The first problem mentioned by the Commission is the lack of transparency, which prevents the proper assessment of risks posed by OTC derivatives. Secondly, it is stated that OTC contracts pose risk to financial stability and is thereby seen as contributing to systemic risk. These two goals are related because risk may only be contained well if regulators are able to assess risks well.

Subject matter and scope (Title 1, article 1)

EMIR sets out the requirements for clearing and reporting OTC contracts. Clearing will have to take place at central counter parties (CCP). EMIR also sets out regulations for the conduct of CCPs and the functioning of trade repositories. The trade repositories shall collect and hold records of all derivative contracts.

This Regulation lays down (…) requirements for derivative contracts (...) and lays down uniform requirements for the performance of activities of central counterparties and trade repositories. (Title 1, article 1, 1)

EMIR also contains rules for interoperability of CCP's. The focus of this analysis is however on requirements for actors trading in OTC derivatives, meaning the clearing, reporting and other risk-reducing requirements.

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17 Regulation of the European Parliament and of the Counsel on derivative transactions, central counterparties and trade repositories.

Clearing obligation (Title 2, article 3,4,5)

Article 3 states the necessary conditions for mandatory clearing of derivatives. The first condition defines the class of derivatives which is subject to the clearing obligation. The second condition concerns the actors. These contracts

a) are not intragroup transactions

b) have been concluded:

(i) between two financial counterparties; or
(ii) between a financial counterparty and a non financial counterparty that meets the conditions referred to in Article 5section (2); or
(iii) between two non financial counterparties that meet the conditions referred to in Article 5section (2); or
(iv) between a financial counterparty or a non financial counterparty meeting the conditions referred to in Article 5 section (2) and a third country entity that would be subject to the clearing obligation if it was established in the (Title 2, Article 3)

Contracts between financial counterparties are subject to mandatory clearing if the contract pertains to a class of derivative subject to the clearing obligation. Non-financial counterparties, such as asset-based energy firms, are only subject to the clearing requirement if position limits are reached, which are not yet specified.

article 4 clearing obligation procedure

Article 4 outlines the procedure for determining which classes of derivatives shall be subject to the clearing obligation. ESMA will be responsible for drafting the technical standards (by 30 June 2012); the Commission's will take the final decision. Similarly, ESMA shall propose transitionary measures, such as determining phase-in for front loaded contracts and '*the minimum remaining maturity of derivative contracts to be frontloaded'* (Article 3.2b).

In determining which classes of derivatives will be subject to the clearing obligation, article 4 formulates several criteria:

a) the degree of standardisation of the relevant class of derivative contracts' contractual terms and operational processes;

(b) the volume and the liquidity of the relevant class of derivatives;

(c) the availability of fair, reliable and generally accepted pricing information in the relevant class of derivative contracts;

ESMA is also instructed to consider the impact of systemic risk and also has to consider the following criteria:

(f) the expected volume of the relevant class of derivative contracts;

(ga) whether one or more CCPs already clear same class of derivatives ;

g)the ability of the relevant CCPs to handle the expected volume and to manage the risk arising from the clearing of relevant class of derivative contracts;

(h) the type and number of counterparties active, and expected to be active within the market for the relevant class of derivative contracts;

(i) the period of time a counterparty subject to the clearing obligation needs in order to put in place arrangements to clear its derivative contracts through a CCP;

(j) the risk management, legal and operational capacity of the range of counterparties that are active in the market for the relevant class of derivative contracts and that would be captured by the clearing obligation pursuant to Article 3.1 (article 3.3)

Article 5 (non-financial counterparty parties)

Article 5 describes in which cases non-financial counterparties shall be subject to the clearing obligation. This is the case if the counterparty exceeds the position limits for more than thirty days in the period of three months (article 5.1). Similarly, a non-financial counterparty is not subject to the clearing obligation anymore, if its positions are over the position limits in less than 30 days during a period of three months.

The position limits will, similar to the technical standards related to the classes of derivatives, be drafted by ESMA. The commission decides based on the ESMA draft. The implementation of article 5.3 is crucial for asset based energy firms:

In calculating the positions referred to in section 1, the non-financial counterparty shall include all the derivative contracts entered into by the counterparty or by other non financial entities within the group to which the non financial counterparty belongs, which are not objectively measurable as reducing risks directly related to the commercial activity or treasury financing activity of the counterparty or of that group. (Article 5.3).

The legislation does not specify how the position limit will be calculated and what these limits would actually be. However, in the case of hedges, the authorities are instructed to exclude derivative contracts that objectively measurable reduce risks, which is not further clarified.

Article 6, Risk mitigation techniques for derivative contracts not cleared by a CCP

Those contracts that do not fall under the clearing obligation will be subject to the requirements of specific risk mitigating techniques outlined in article 6. Among them are basic rules regarding confirmation of contracts and procedures to *reconcile portfolios, manage associated risk*, identify disputes and monitor the value of outstanding contracts. The main requirement is the requirement to mark-to-market outstanding contracts on a daily basis.

Financial counterparties and non-financial counterparties referred to in Article 5 (1) shall mark-to-market on a daily basis the value of outstanding contracts. Where market conditions prevent marking-to-market, reliable and prudent marking-to-model shall be used by the financial and non-financial counterparties referred to in Article 5 (1). (Article 6, 1a)

The commission has to implement the standards determining which market conditions prevent marking-to-market. Furthermore, both financial and non-financial counterparties '*shall have risk management procedures that require the timely (...) accurate and appropriate exchange of collateral with respect to derivatives contracts entered into on or after the clearing threshold is breached* (article 6.1aa). Further implementation of the required level of collateral is delegated to the commission.

Article 7, Reporting obligation

Finally, EMIR requires that all derivative contracts are reported to a trade depository. All contracts, modification and termination have to be reported no later than the next working day.

Counterparties and CCPs shall ensure that the details of any derivative contract they have concluded and any modification, or termination of the contract is reported to a trade repository registered in accordance with Article 51 or recognised in accordance with Article 63 (…). (article 7.1)

The reporting obligation shall at least include the contracting parties and the main characteristics of the contracts. What is further included will be decided by the Commission.

3.3 CRD

The second set of regulations studied in this report are related to the Capital Requirement Directive (CRD). How wil capital requirements affect firms trading in energy derivatives?

3.3.1 Exemptions MiFID

Mifid determines which firms are subject to the CRD requirements. Exemptions that excluded energy firms from CRD requirements are currently under review and will most likely be changed.

In determining which firms are subject to the Capital Requirements Directive, the *Markets in Financial Instruments Directive (*MiFID) comes in. MiFID determines which firms are characterized as financial institutions and are subsequently subject to a whole set of financial market legislation (e.g. mandatory central clearing under EMIR, banking style capital requirements under CRD and market abuse rules under MAD) More specifically, MifiD licenses financial firms and sets rules for supervision and transparency, but at the same time determines which firms are subject to capital and liquidity requirements under CRD. As a rule, firms that fall under the scope of MiFID are automatically subjected to CRD. This link is created by the definition of investment firm in CRD. Investment firms means institutions as defined in article (4)(1)(1) of directive 2004/39/EC which are subject to the requirements imposed by that directive [..] (EC 2011 article 4.8). This report shall not delve into the consequences and the necessities related to the rules and operational requirements of MiFID itself, but focuses instead on the consequences CRD regulations for energy firms.

Under the current regulations (MiFID 2004/39/EC, 2006/73/EC and Regulation No 1287/2006)[18], energy firms are not within the scope of this regulation. Revision of MiFID is planned to enter into force in 2013 and widens the scope of firms that will have to comply with the regulations. The explanation of the draft regulation for MiFID II states that the extension of transparency rules are justified "by the fact that the existing level of transparency of these products mostly traded OTC is not always considered sufficient". The consultation paper for reviews of MiFID proposes to delete several exemptions for commodity firms. Accordingly, the exemptions under the draft directive are limited in comparison with MiFID I. The exemptions under review that are relevant for commodity firms are:

1. Dealing on own account exemption

This Directive shall not apply to:

[...](i) persons dealing on own account in financial instruments or providing investment services in commodity derivatives or derivative contracts included in Annex 1, section C10 to the clients of their main business, provided this is an ancillary activity, to their main business, when considered on a group basis, and that main business is not the provision of investment services within the meaning of this Directive or banking services under Directive 2000/12/EC (2004/39/EC, article 2.1(i))

[...]

Persons whose main business consists of dealing on own account in commodities and/or commodity derivatives. This exception shall not apply where the persons that deal on own account in commodities and/or commodity derivatives are part of a group the main business of which is the provision of other investment services within the meaning of this Directive or banking services under Directive 2000/12/EC (2004/39/EC, article 2.1(k)).

In the consultation paper (EC 2010), the commission proposes to delete part of the exemption based on article 2.1(i) and the complete exemption based on article 2.1(k). Dealing on own account with clients of the main business would be excluded from the exemption. The draft proposal for MiFID II does indeed not contain this exception. Exemption 2.1(i) would be limited to providing investment services as ancillary activities. Exemption 2.1(i) would be the only exemption that energy companies could use to remain exempted from financial regulation under MiFID. However, it is not clear if energy companies are actually able to use this exemption, if the directive comes into force.

2. Providing investment services as an ancillary activity

As part of the revision of MiFID, the European Commission proposes to limit the exemption based on ancillary services by quantitative (e.g. based on revenue from the ancillary activities) and qualitative (dedication of resources) thresholds. It is unclear yet to what extent the exemption based on ancillary activities shall be limited. The draft proposal of MiFID II does not specify a limitation to the ancillary activities exempted. Nor is it clear from the text of the draft proposal what the definition is of ancillary services.

This Directive shall not apply to:

[….] (i) persons dealing on own account in financial instruments, excluding persons who deal on own account by executing client orders, or persons providing investment services in commodity derivatives or derivative contracts

18 MiFID 2004/39/EC is the framework directive

included in Annex I, Section C 10 or emission allowances or derivatives thereof to the clients of their main business, provided that in both cases this is an ancillary activity to their main business, when considered on a group basis, and that main business is not the provision of investment services within the meaning of this Directive or banking services under Directive 2000/12/EC (draft MiFID II, article 2)

Providing investment services is in this draft no longer exempted from MiFID. Dealing on own account as an ancillary activity is however still exempted.

3.3.2 Capital requirements

As a consequence of limiting the exemptions in MiFID, more energy firms will be subject to capital requirements of the CRD Directive. CRD determines the capital and liquidity buffers (financial) institutions should carry.

Tabel 3.2 Elements CRD IV

Element	
Capital requirements	8% of which 6 % tier 1 + capital conservation buffer (2,5%)
Liquidity	Liquidity Cover Ratio (LCR) + net stable funding ratio (NSFR)
Leverage ratio	Reporting obligation + discretion of supervisory bodies for applying to individual banks

Source: SEO Economic Research based on EC 2011, DNB 2011

Financial institutions have to hold a risk weighted capital of 8%, which is similar to Basel I. Basel II introduced different tiers of capital and Basel III further increased the requirement towards high quality capital. Financial institutions have to hold under Basel III and CRD IV 4.5% of core tier 1 capital.[19] This exists of shares and retained income. Total tier 1 capital has to be minimally 6% and total capital 8%. On top of these buffers, there will be an additional Capital conservation buffer of 2,5%[20] that may be used in times of stress. National regulators may also demand building up a countercyclical buffer of up to 2,5% in good times. National regulators shall require this buffer in times that credit growth exceeds economic growth (DNB 2011, 2).

Liquidity requirements

Liquidity standards will be implemented in 2015 (LCR) and 2018 respectively (NSFR) (EC 2011b, 13). The Liquidity Cover Ratio (LCR) aims at ensuring that financial institutions may deal with relatively high stress, facing strong liquidity outflows during the course of one month. Under circumstances not specified in the proposals, competent authorities may waive this requirement to individual credit institutions or investment firms (EC 2011b, 14). The NSFR aims at posing requirements that makes financial institutions able to cope with a year long period of high stress (DNB 2011, 2).

Leverage

A non-weighted capital requirement may become a standard part of the EU legislation from 2018 onwards. Until 2018, supervisory authorities may use the instrument for individual banks under specified circumstances. Moreover, all financial institutions will have a reporting obligation of

19 A transition period will be in place between 2013 and 2015
20 Transition period between 2016 and 2019

their leverage. This period until 2018 shall be informative for the decision to introduce the leverage ratio as a binding regulatory tool (EC 2011b, 14).

3.3.3 How CRD would work out for energy firms

Pretext Proposal for a Regulation of the EP and the Council on prudential requirements for credit institutions and firms (July 2011)

Among the aims of the revision of the CRD is mitigating the risks associated with trade in OTC derivatives. The proposed regulations should be viewed in concurrence with EMIR. EMIR directly mitigates counterparty credit risks of standardized contracts falling within the classes of derivatives subject to the obligation while CRD aims at providing an incentive for clearing OTC derivatives, as cleared OTC derivatives will be subject to lower capital requirements.

"The review of the treatment of counterparty credit risk, and in particular putting in place higher own funds requirements for bilateral derivative contracts in order to reflect the higher risk that such contracts pose to the financial system, forms an integral part of the Commission's efforts to ensure efficient, safe and sound derivatives markets. Consequently, this Regulation complements the Commission proposal for a Regulation on OTC derivatives, central counterparties and trade repositories, of 15 September 2010' (pretext EC 2011, Proposal on prudential requirements for credit institutions and investment firms, point 63).

The capital requirements for cleared contracts shall be limited as exposures to CCP's involve little risk. Yet, the commission proposes a positive capital requirement to reflect the fact that also exposures to a CCP is not completely riskless.

'Trade exposures to CCPs usually benefit from the multilateral netting and loss-sharing mechanism provided by CCPs. As a consequence, they involve a very low counterparty credit risk and should therefore be subject to a very low own funds requirement. At the same time, this requirement should be positive in order to ensure that credit institutions and investment firms track and monitor their exposures to CCPs as part of good risk management and to reflect that even trade exposures to CCPs are not risk-free' (Ibid. point 60)

3.3.4 Calculation rules

The currently in place Capital Requirements Directive is the consolidated version of CRD III from 2006. The specific rules for calculating capital requirements for commodities risk are to be found in Annex IV of EC 2006/49. The calculation rules proposed by the European Commission are found in *Proposal for a Reguation of the EP and the Council on prudential requirements for credit institutions and firms* (20.7.2011). The calculation rules for commodity risks are largely similar in both documents.

Own funds requirements for trade exposures

'An institution shall apply a risk weight of 2% to the exposure values of all its trade exposures with CCPs (Article 297 EC 2011).'

The risk weight of exposures to CCPs is 2%. This risk weight shall apply to all cleared energy derivatives. The capital requirement is in turn 8% of this 2%. Capital requirements for non-cleared contracts are significantly larger. In calculating these requirements, firms have some freedom in deciding the most appropriate way to determine risk. Institutions may opt for the simplified approach, the maturity approach or use an internal risk model.

Maturity approach for calculating capital requirement for non cleared OTC derivatives

In the maturity approach the capital requirements are calculated as the sum of:

*(a) the sum of the matched long and short positions, multiplied by the appropriate spread rate as indicated in the second column of [*Tabel 3.3*] for each maturity band and by the spot price for the commodity*

(b) the matched position between two maturity bands for each maturity band into which an unmatched position is carried forward, multiplied by 0,6% (carry rate) and by the spot price for the commodity

(c) the residual unmatched positions, multiplied by 15% (outright rate) and by the spot price for the commodity (EC 2006/49 Annex IV)

In case long and short positions fall in the same maturity band, they are referred to as matched positions within the same maturity band. Positions can also be matched if they fall in different maturity bands. In that case a carry rate of 0,6% of the spot price applies. The capital requirement for net positions or unmatched positions is 15%. Article 348 of the EC proposal (2011) did not change compared to EC 2006/49/Annex IV.

Tabel 3.3 Different maturity bands

Maturity Band	Spread Rate
0 – 1 month	1,5%
1- 3 months	1,5%
3-6 months	1,5%
6-12 months	1,5%
1-2 year	1,5%
2-3 year	1,5%
> 3 year	1,5%

Source: Article 348 proposal EC 2011 (or EC 2006/49 Annex IV point 13)

The simplified approach

In the simplified approach, there is no carry rate, but a higher rate for all matched positions.

'The institution's capital requirement for each commodity shall be calculated as the sum of:
(a) 15% of the net position, long or short, multiplied by the spot price for the commodity; and
(b) 3% of the gross position, long plus short, multiplied by the spot price for the commodity´(annex 2/point 19)

Article 349 of the EC proposal (2011) did not change compared to EC 2006/49/Annex IV.

Use of internal models to calculate capital requirements (Annex V)

With explicit permission of the competent authorities, institutions may use their own risk management models for calculating the capital requirement. *'Recognition shall only be given if the competent authority is satisfied that the institution's risk-management system is conceptually sound' (annex 5).*

One of the methods to evaluate the soundness of the models is the mandatory calculation of overshooting. *´An overshooting is a one-day change in the portfolio's value that exceeds the related one-day value at risk measure generated by the institution's model*'. Based on the number of overshootings, the capital requirement shall be multiplied by a factor between 1 and 2.

The proposal of the European Commission for the revision of CRD further specifies the rules for using own management models for calculating capital requirements. Using internal risk model shall be permitted by the competent authorities per risk categories, among them commodities risk. The European Banking Authority shall draft standards that determines the rules under which circumstances permission shall be given (EC 2011, article 352/2). The requirements for the internal model are laid down in article 356.

Correlated commodities

The competent authorities may regard the following positions as positions in the same commodity

(a): positions in different sub-categories of commodities in cases where the sub-categories are deliverable against each other; and

(b): positions in similar commodities if they are close substitutes and if a minimum correlation of 0.9 between price can be clearly established over a minimum period of one year' (annex 2/ point 7).

This means that correlated commodities may be treated as the same commodity in calculating net positions. The capital requirement may be equal to margins paid at exchange traded futures or cleared OTC derivatives.

The proposal by the European Commission (20 July 2011) for the revised CRD keeps this mechanism intact. (Article 346, 20.7.2011, COM(2011) 452 final).

Valuation adjustment risk
Institutions subject to CRD have to hold additional own funds for credit valuation adjustment risk from OTC contracts. This additional capital requirement aims at reflecting counterparty credit risk. Cleared contracts are exempted from this requirement (see article 372.3 EC proposal July 2011).

Institutions with persmission to use internal models have to use the advanced method for calculating own funds requirements for CVA risk in accordance with article 373. Other institutions have to use the standardized method as laid out in article 374. The capital requirement is dependent on the credit quality, effective maturities, exposures of counterparties and hedge funds. Exposure to counterparties increases the capital requirement, whereas hedges lower the capital requirement. Weight of counterparties vary between 0,7% and 10% depending on credit quality.

3.4 Conclusion

This brief review of the financial regulation under revision or discussion in the EU underscores that systemic risk is a main aim for this type regulation. Practically, for OTC markets regulations like EMIR and CRD both aim at reducing counterparty credit risk related to OTC derivative contracts. This is done via a diverse set of requirements such as mandatory central clearing in the case of EMIR, whereas CRD requires higher levels of capital for non-cleared contracts. The regulation is set up so that OTC derivative contracts are either mandatory cleared in combination with a low capital requirement (the risk weight for exposures to CCP's is only 2%) or subject to higher capital requirements (see calculation rules for the different methods).

An important conclusion of this chapter is that this regulation may have economic repercussion well beyond the financial system. Commodity derivative markets such as energy OTC contract are also likely to fall under its scope. Compared to current practice both EMIR and CRD require that substantial amounts of capital have to be reserved in order to be able to trade in derivatives. Capital used for this purpose is tied up cannot be employed in a different and more profitable way, such as investment. If the extra capital which has to be set aside reduces (systemic) risks this is perfectly defendable. However, if risks are not reduced this does not seem appropriate.

Chapter 5 investigates the balance between the costs and benefits of financial regulation when it would, at some future instance, be applied to OTC markets in the energy sector. First, this study addresses the economic characteristics of energy derivatives markets in power and gas.

4 Electricity and gas derivatives market

In the energy market OTC contracts are generally not centrally cleared but subjected to risk management aiming to find the optimal solution to the triad challenge of market risk, credit risk and liquidity risk. Globally commodity derivative trade is but a fraction of OTC trade and OTC trade in energy derivatives is an even smaller fraction of this share. In the Netherlands the volume of cleared OTC gas contracts is growing; in the power market the volume of cleared OTC contracts has been more or less stable in the past few years.

4.1 What are energy derivatives?

Trading in wholesale power and gas takes place on energy exchanges and Over-the-Counter (OTC-trade). On both trading platforms, energy products are traded on spot markets and derivative markets. Products traded on spot markets are directly physically delivered, whereas derivative products are optional and non-optional contracts for delivery at a specified time for a specified price. Settlement of future contracts are often financial. Forwards, futures and swaps are the mostly used derivative products at wholesale energy markets. Before turning to the function of these future products, some concepts will be defined.

Figure 4.1 Wholesale markets in power and gas

Source: Rademaekers, Slingenberg & Morsy 2008

Concepts

Exchange trade en OTC Trade
The first distinction to be made is the distinction between trade on exchanges and over-the-counter trade (OTC). OTC contracts are contracts between two actors, often facilitated by broker-dealer firms. In some studies, a distinction is made between OTC trade and bilateral trade, where OTC trade necessarily involves brokers or dealers (eg. Rademaekers et al. 2008 & NMa

2010). Bilateral trade is in this view trade between two actors without the intermediation of a broker or a dealer. *This study chooses however to define OTC contracts as all non exchange traded contracts.*

Spot and derivative markets
The second important distinction is between the spot market and derivative markets. In the spot market, delivery directly follows the transaction.[21] Derivative products on the other hand are contracts for delivery at a specified time for a specified price. The derivatives may be either optional (options) or non optional (forwards, futures, swaps).

Futures as standardized forwards
The concepts of forwards and futures are similar and distinctions between the two are made in different ways in the literature. This report distinguishes between these concepts on the basis of standardization. Forwards are defined as a non-optional contract between parties for delivery for a certain price at a certain date. A future has the same characteristic, but is standardized in terms of quality, quantity, date and place of delivery (Cinquegrana 2008, 2). Other definitions, not followed in this report, require a future contract to be traded at an exchange (eg. Burger et al. 2007).

Hedging and speculation
A hedger transfers risk, whereas a speculator assumes risk for an expected profit (premium).[22] The traditional focus on hedging in the literature has been on producers who reduce the variability of their income (Clifford, Smith, Stulz 1985, 391). Clifford et al. propose the following definition: 'hedging reduces the dependence of a firm's value on changes in the state variable' (Clifford et al. 1985, 393). The state variable would in this case be the input and output prices of energy sector. The nature of these prices differs for firms, depending on their position in the market, i.e. producer, supplier or both. The significance of this definition is that it is also possible to hedge through a derivative commodity product if a firm does not itself produce or actually buy the derivative.

4.2 Function of derivatives in commodity markets

Energy derivative markets exist because actors in the markets seek to hedge market risk. At the same time, fixing prices provides better guidance for production, supply and consumption decisions.

Trade in derivative products tends to arise in sectors exposed to unpredictable price fluctuations. Energy products are typical products that belong to this category. A cold winter raises demand for energy and thereby raises prices. As energy is widely considered a primary good, prices have to increase a lot to influence demand.
Electricity and gas markets have many factors in common that influence prices and volatility. These are:

- Mean reversion: prices fluctuate in the medium term around an equilibrium.
- Seasonality: Prices follow a seasonal pattern

21 Directly is meant as within a few days
22 Speculation is also referred to as 'trading on own account'.

- inelastic prices: prices have a relatively low influence on demand
- investment costs for production: this means high fixed costs and it takes time to increase production capacity
- necessity of a transmission network: this leads to regional markets (Burger et al. 2007)

Specific to electricity is its limited possibilities to be stored, to the extent that it is in most countries de-facto non storable. As demand and supply of electricity has to match exactly at all times, electricity prices also show price patterns during the day. With storage as an impossibility, there is no necessary relationship between spot prices and future prices, which leads to even higher volatility.

In this environment of volatile prices, both producers and customers may want to lock up prices. Without fixing prices, customers face the risk that prices will have gone up and sellers face the risk that prices will have gone down by the time of delivery. This market risk may be controlled by currently agreeing on a price for delivery in the future. If a producer and a customer agree on such a contract, both sides of the contract have hedged market risk. Clearly, the contracting parties will also not profit from positive price developments.

A related reason for producers and consumers to trade in derivative contracts, is that fixed prices are a better guide for making production and purchasing decisions. Energy prices may be an important part of the costs for an industrial consumer. Uncertainty about prices in the future, also brings uncertainty in its profit maximizing production levels.

Derivative contracts without optionality may be a contract between two hedging parties. Nevertheless, there are alternative motivations for entering these markets. These are assuming risk for a premium and market making. Speculators and market makers provide the necessary liquidity to the market. In its absence, finding a counterparty for hedging may be cumbersome. The role of market making and speculation is assumed by the bigger energy firms, specialist traders and banks.

4.3 Clearing

Controlling market risk creates counterparty risk. This may be mitigated in turn by clearing. Nevertheless, clearing is not standard conduct in the energy derivative market. Important motivations for not clearing are clearing fees and possible liquidity risks.

Energy derivative contracts may control market risk for a hedger, but may depending on the price developments lead to credit risk (Box 4.1 provides a full overview of risks and risk management). This credit risk, is the risk that a counterparty cannot meet its obligations. This may be quantified as the difference between the actual value of the contract and the initial price of the contract. If an industrial consumer buys electricity for € 50/MWh for delivery one year later, the price of electricity and therefore the value of the contract may have risen to € 60/MWh.

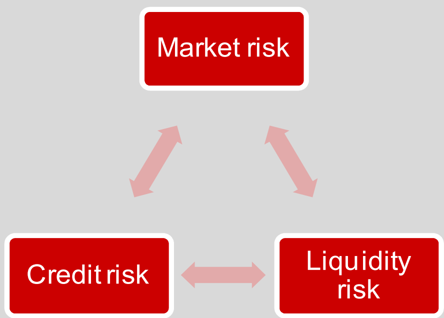
Counterparty credit risk in this case is equal to the difference between these prices, namely €10/MWh.[23]

Box 4.1 Hedging, speculation and risk management

To understand the risk management of energy companies it is essential to acknowledge that market risk, credit risk and liquidity risk are closely intertwined. As a natural part of their business operations – the production and/or retail supply of energy – energy companies face market risk. Hedging via derivative trading is aimed to reduce this market risk but brings along a credit risk on the derivative counterparty. This risk on its turn can be hedged by means of clearing or bilateral margin agreements. Whether, and to what extent, this is necessary depends on the (net) position against a counterparty and its financial position. Evidently, this must be based on sound upfront and continuing counterparty analysis. For non-cleared OTC contracts this, in turn, results in liquidity risk as both parties in the deal may have insufficient cash-potential to post required (future) margins.[24] Even if liquity risk can be handled, this comes at a price in the form of capital costs. Liquidity risk (costs) can be so substantial, that there exists a trade-off with market risk. Energy companies constantly analyze positions, counterparties and clearing costs in order to achieve an optimal risk position at lowest costs. This process of taking and managing risks based on the company's risk attitude and related costs is illustrated in Figure 4.2.

Hedging via derivative trading is thus regareded as part of the core business of energy companies and necessary to carry out the physical side of the market: production and retail supply of energy. In the process of managing their risks energy companies also obtain positions which are indirectly but not directly connected with their physical operations. This occurs when firms trade on own account in order to arbitrage between different products or engage in speculation. Speculation is indeed profitable for the company but also aids the hedging task: trading on own account masks their (intended) hedge positions and thus allows traders to secure better deals for their hedging needs.[25] Risks taken as part of derivative trading are mostly managed through internal procedures and tools, like maximum Value at Risk.

Figure 4.2 Clearing restricts options in risk management



Source: SEO Economic Research, based on interviews and sector analysis

23 Interest rates are not taken into account in this example.
24 In theory, also cleared deals might pose credit risks. For now, it is assumed that CPs will be properly regulated to prevent this.
25 Other benefits of proprietary trading, mentioned during interviews, were e.g. enhanced market liquidity, improved internal knowledge and management of commodity derivative trading, and higher returns.

Counterparty risk may in turn be mitigated by clearing. A clearing house acts as a central counterparty for both sellers and buyers of the future and guarantees delivery or payment according to the contract. Instead of one contract between buyer and seller, both the buyer and the seller have a contract with the central counterparty or with a clearing member of the clearing house. Margins are paid over outstanding net positions and fees are paid based on transaction volume. Clearing members pay margins in cash or accepted securities to the central counterparty. Non clearing members have in turn to pay margin to the clearing members. Both initial and variation margins have to be paid for power and gas futures. Variation margin is settled daily and is used to secure meeting obligations of open positions. The buyer of a future has to pay variation margin if the price of the future decreases, because there is a bigger difference between the agreed price in the contract and the price in the market. In volatile markets, both buyers and sellers may have to put up variation margin at some point.

Trade in futures on power exchanges is automatically cleared as clearing is an inherent part of exchange trade. Future contracts in OTC trade are not automatically cleared, but the contracting actors may decide to do so. Currently, depending on the market, between 10% and 30% of all derivative contracts is cleared. Whether they choose to do so depends on several factors, an important one being the necessity to bring down exposure to a specific counterparty. This could be the case if relatively high volumes are traded with one counterparty or when the trading partner has a low credit rating. Clearing may also be beneficial if actors know little about each other, for example when they have little experience dealing with each other. Another advantage of clearing is that energy firms can net all their outstanding positions.

Disadvantages of clearing are clearing fees and potential liquidity problems. Liquidity problems could especially arise at smaller asset based energy firms, because these firms hold mainly non liquid assets. Such a firm may want to hedge the risk of decreasing energy prices. If prices increase however, the difference between the value of the contract and the agreed price of the contract is positive. The energy producer would have to put up variation margin in order to cover this difference. Clearing houses would only accept cash and possibly government bonds as collateral, but not underlying production capacity or letters of credit from banks, which is currently common practice. As price fluctuations may force actors to credit their margin account, clearing also counteracts 'the initial reason for trade, smoothing cash flows' (Alexander et al. 2011, 43). Here we may again point to the mechanism to manage risk and liquidity positions, explained in Box 4.1.

As explained above, circa 70% to 90% of traded OTC contracts in the energy derivative markets is not cleared. Instead, firms use their own credit risk management, monitoring the creditworthiness of their counterparties. Generally, no collateral is paid until a threshold determined by the firms themselves. If trading exposure with a firm exceeds the threshold, only the loss-making side of the transaction has to put up margin. This margin is held by either the seller or the buyer of the contract. This means that the actors involved are more concerned with counterparty credit risk than the risk that the counterparty cannot deliver. In contrast with exchanges, in OTC markets collaterals are not automatically settled daily. They may however be settled if the value of the future contract decreases. Whether this happens depends again on volumes and perceived risk. According to information from the sector, most OTC markets actually use collaterals to settle variation margins at a daily basis. Variation margins are constantly monitored and paid out to the counterparty if a predetermined threshold is surpassed.

4.4 Actors in the market

Energy market parties generally trade internationally and own several production facilities, making them producers, suppliers to (industrial) consumers, and traders at the same time. These players tend to concentrate their trade at specific locations. They are active in all types of energy commodities (power, gas, coal, CO_2) and are important players both as owners of production facilities and as market makers in the energy derivative market.

Apart from these bigger players, there are several hundred other players active in the European energy derivative market (Michetti 2011, 2). These players are smaller asset based energy firms, large industrial consumers, non asset based suppliers to (industrial) consumers, traders and banks. Energy firms are often each other's counterparty in OTC trade. Commodity traders active in the market need an significant amount of capital to play an active role in this market. The number of active banks is limited. Regular players in this sector are JP Morgan Chase, Goldman Sachs, BNP Paribas, Deutsche Bank, Credit Agricole, CitiGroup, Merill Lynch, Barclays, Nomura and Macquarie. As a rough estimate, banks act as financial counterparty in 10% of the contracts in the energy derivative market. This percentage is relatively low compared to other commodity derivatives. Traders and banks act as counterparties for both sides (seller and buyer) and do not seem to act as ultimate risk takers. Traders, but also larger energy firms themselves, may act as arbitrageurs, connecting future and spot prices.

Relatively new actors in the market for energy derivatives, are exchange traded funds that use commodities markets in their portfolio to hedge risks, for commodities tend to be negatively correlated with other securities as stocks and bonds. According to some sources, commodity derivatives held by institutional investors have increased rapidly between 2002 and 2008 (Basu & Gavin 2011) but the exact size of their market share is unknown.

Table 4.1 Actors in electricity and gas derivatives markets

Actor	Role	Hedge / speculate
large asset based energy firms	Producer, market maker, trader, supplier to consumer	Both
other asset based energy firms	Producer, trader, supplier to consumer	Both
Non asset Suppliers	Supplier to (industrial) consumers	Hedge
Traders	Market maker, trader	Speculate
Limited number of banks	Trade	Speculate
Industrial consumers	Buyer	Hedge

Source: SEO Economic Reseach

The large asset based energy firms are generally also active in the Netherlands, as are several smaller asset and non-asset based firms. A 2008 report from Ecorys named Essent (currently part of RWE AG), Nuon (currectly part of Vattenfall) and Merril Lynch as the major traders in the Dutch OTC power market. The most important brokers were Spectron, ICAP and Prebon.

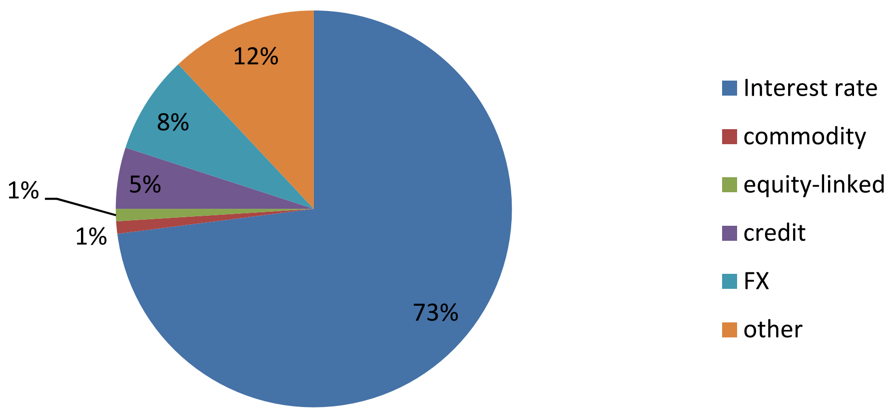
There are around 90 shippers listed as trading on the TTF market. These actors include the larger asset based energy firms, smaller asset based firms, trading companies as Glencore and banks. The Dutch competition authority NMa and AFM concluded that speculators and hedge funds are hardly active on the TTF gashub (NMa & AFM 2011).

4.5 Volumes

The majority of trade in gas and electricity are OTC contracts without clearing. Of all global OTC contracts however, the share of commodity contracts is limited.

OTC energy derivative trade is a relatively small part of global OTC in derivatives. In terms of notional value, interest rates derivatives are by far the largest (73%) followed by foreign exchange (12%). All commodity derivatives combined, of which energy derivatives are only a part, have a notional value of less than 1%. Notional value of total global trade in OTC contracts was $ 615 trillion in 2009 (Tabbgroup 2010, p13). Notional value of OTC commodity contracts in 2010 was a bit lower than $ 3 trillion (BIS Quarterly Review, 2011). It should be noted however that a measurement of notional value is not the same the actual risks related to these products.

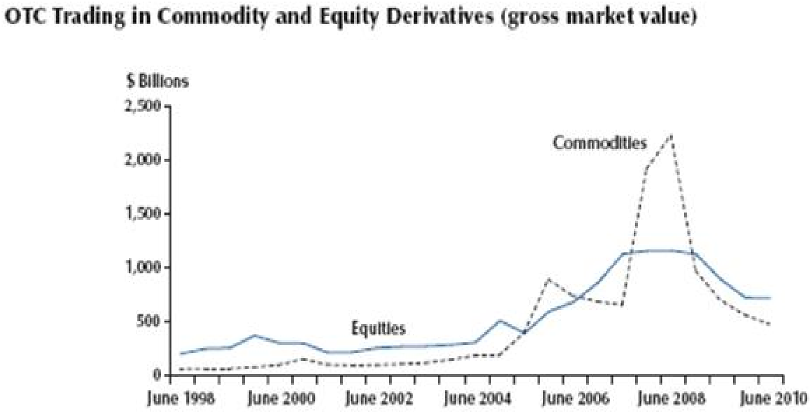
Figure 4.3 Commodity trade less than 1% of wordwide OTC trade



Source: Tabbgroup 2010

Although commodities have a relatively low share in all OTC contracts, the gross market value has increased significantly between 1998 and 2010. Several explanations have been put forward for this development, but the role of institutional investors is crucial in most of these explanations. Their long position has increased from less than $ 20 billion in 2002 to more than $ 250 billion worldwide in 2008 (Basu & Gavin 2011, p.40).

Figure 4.4 Increase in commodity trading between 1998 and 2010



Source: Basu & Gavin 2011, p.41

The majority of trade in gas and electricity are OTC contracts without clearing.

The gas hub TTF is the (virtual) market place for trade in natural gas. The distribution system operator registers the owners of the gas in the network. The share of TTF of the total gas streams in the Netherlands has grown over the last years to 26% in 2009[26]. Similar gas hubs are NBP (United Kingdom), Gaspool, NCG (Germany) and Zeebrugge (Belgium). NBP is the biggest gas hub in Europe, TTF the second (GTS 2011).[27] Churn rates were well above three in the years between 2006 and 2009.

Table 4.2 Growing share of trade through gashub TTF

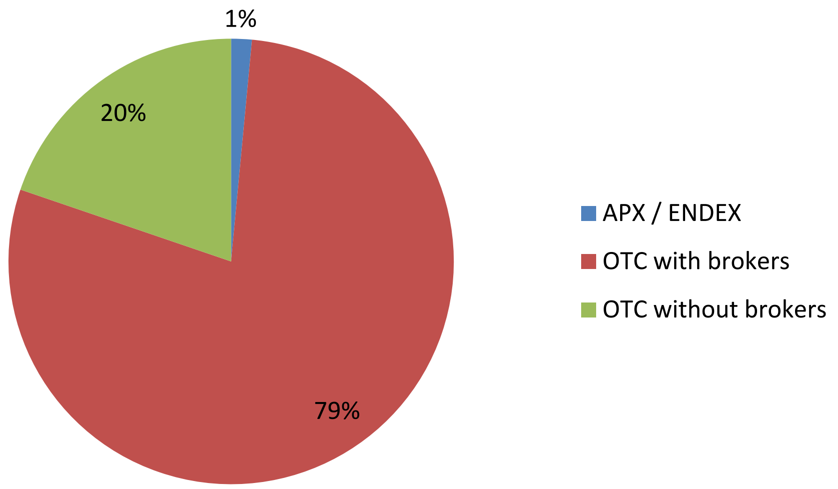
	2006	2007	2008	2009
Share TTF of total gas streams	6%	8%	18%	26%
Churn on TTF	3,3	3,7	3,2	3,1

Source: NMa 2011, p. 38

TTF provides the necessary infrastructure for the functioning of an exchange in gas. Delivery of gas in the future gas market Endex is on TTF. Of the estimated TTF market size of 2600 TWh in 2009, 79 % is OTC traded through brokers, around 20 percent is bilateral trade without brokers and trade via the exchange APX/Endex is marginal.

26 This percentage has most likely increased since then.
27 http://www.gastransportservices.nl/corporate/actualiteit/ttf-even-aantrekkelijk-als-nbp

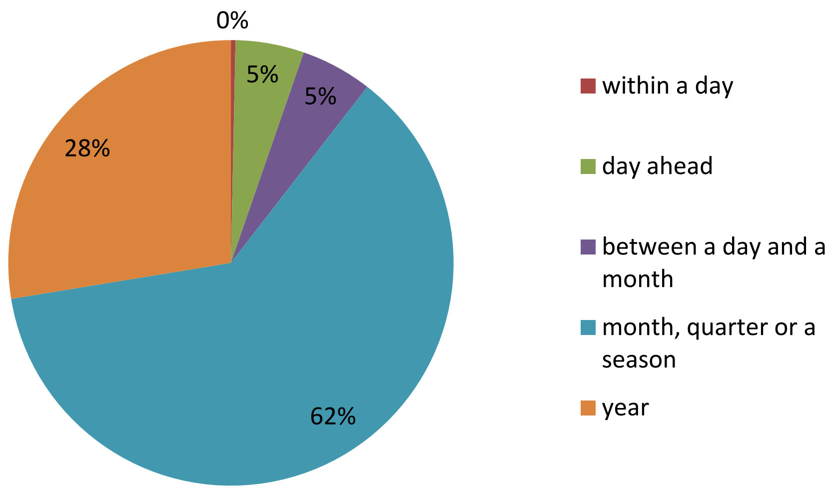
Figure 4.5 Mainly OTC trade on TTF gas market (2009)



Source: NMa 2011, p. 40

More than 60% of the traded products were products for delivery of a month, quarter or season. Almost 30% of the contracts were contracts for the period of one year. The share of contracts for one year is more than 50% for OTC contracts without the intermediation of a broker (NMa 2011, 40).

Figure 4.6 Gas trade on TTF largely month, quarter and season products

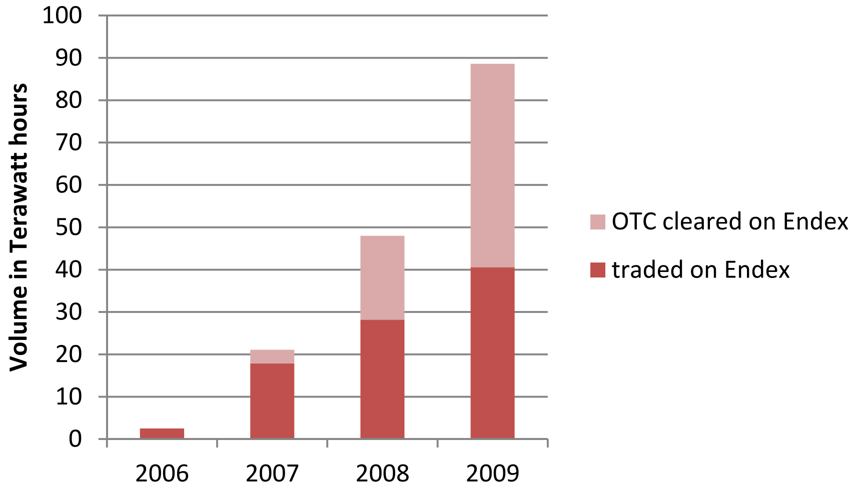


Source: NMa 2011, p. 40

40 TWh were traded on Endex in 2009 and almost 50 TWh OTC contracts were cleared. Although this is a significant increase compared to 2006, these amounts are relatively limited. This means that the bulk of trade in the gas market is OTC trade without central clearing. The

vast majority of these deals is being conducted via EFET contracts with OTC marginging agreements between counterparties as credit management mechanism.

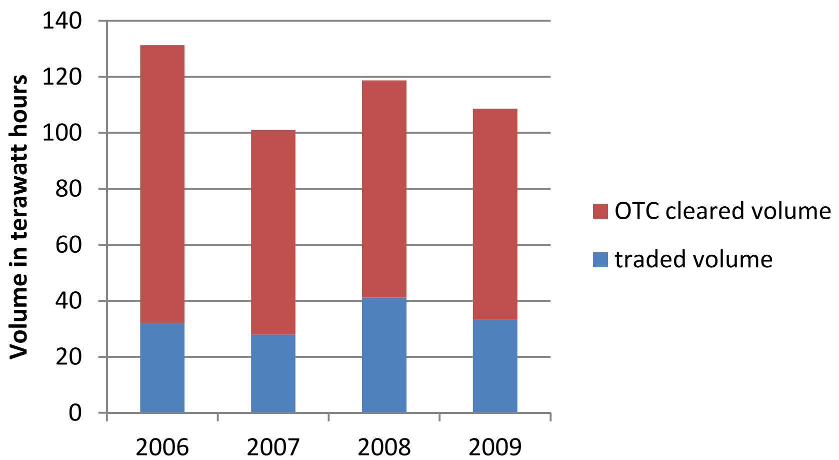
Figure 4.7 Gas trade on Endex and clearing of OTC contracts are growing



Source: NMa 2011, p. 39

The NMa monitor for the wholesale gas and electricity markets does not provide an estimation of total trade in the power market, but does report the development of traded and cleared power derivatives on Endex. In contrast with cleared volume in the gas market, for electricity there is no trend visible towards more clearing. 10% of total trade in electricity in the European Union is currently traded on power exchanges (Meeuws 2010, p. 1). The amount traded of electricity in the EU is 30% of total consumption. Energie Nederland comes up with a similar figure for 2010 (Energie Nederland 2011, 23). Assuming equal churn rates, around 10% of electricity trade is likely to be conducted through exchanges in the Netherlands.

Figure 4.8 Power trade on Endex



Source: NMa 2011, 72

4.6 Conclusion

Derivative trading plays a natural role in power and natural gas markets due to the need to hedge price risks. OTC contracts are generally not centrally cleared but subjected to risk management aiming to find the optimal solution to the triad challenge of market risk, credit risk and liquidity risk. Globally commodity derivative trade is but a fraction of OTC trade and OTC trade in energy derivatives is an even smaller fraction of this share. This indicates that the likelihood of systemic risk emerging on energy derivative markets is much smaller than on financial derivative markets.

In the Netherlands there is a lack of public information on the total volume of energy derivative trading. The best information available concerns the volumes of cleared OTC trade and the volume of trade on exchanges. These statistics show that the volume of cleared OTC gas contracts on TTF is steadily growing, underscoring the increased liquidity of this market. In the power market the volume of cleared OTC contracts has been more or less stable in the past few years.

The players on these markets come from all corners in Europe. Energy market parties generally trade internationally and own several production facilities, making them producers, suppliers to (industrial) consumers, and traders at the same time. These players tend to concentrate their trade at specific locations. They are active in all types of energy commodities (power, gas, coal, CO_2) and are important players both as owners of production facilities and as market makers in the energy derivative market.

Apart from these bigger players, there are several hundred other players active in the European energy derivative market. These players are smaller asset based energy firms, large industrial consumers, non-asset based suppliers to (industrial) consumers, traders and banks. Energy firms are often each other's counterparty in OTC trade. As a rough estimate, big banks like JP Morgan and BNP Paribas act as financial counterparty in 10% of the contracts in the energy derivative market. This percentage is relatively low compared to other markets for commodity derivatives and again indicates the small likelihood of price volatility on energy derivative causing some kind of systemic risk affecting financial markets worldwide.

5 Regulatory Impact Assessment

The benefit of mandatory central clearing is small given the small likelihood of systemic risk occurring on energy derivative markets. This small benefit of regulations like EMIR must be compared to the costs of implementing them, which are potentially very high.

A Regulatory Impact Assessment (RIA) provides insight in the advantages and disadvantages of (intended) regulation. It is a useful tool to analyze the impact of regulation and confront the intended objectives, and possibly unintended advantages, with potential negative effects. Here, focus is on assessing the economic (welfare) impact of implementing EMIR in the energy sector compared to a situation where this is not done.[28] The central questions are: what are the potential benefits and costs of EMIR and do benefits exceed the costs?

This chapter answers these questions in a qualitative manner. The starting point for this exercise is the theory of market failures, which assumes away government regulation and then investigates the extent to which market participants are able to accommodate external effects in freely negotiated bilateral or multilateral transactions. If market exchange fails to accommodate external effects, a rationale for government intervention in the form of regulation may exist. But before the step towards regulation is taken a few core questions need to be answered:

- Does regulation effectively accommodate external effects and at what direct cost to society?
- Government intervention may have an unexpected impact on the economy through indirect effects, costs and possibly benefits, rechanneled through price and quantity adjustments to other sectors and markets than those that are the principal target of regulation. What is the impact of these indirect effects?
- Direct and indirect costs of government intervention constitute regulatory failure. Do these costs outweigh the benefits of intervention? In this case, economic welfare is best served by abstaining from regulation and allowing the market to run its own course.

Comparing a baseline situation without regulation to a specific form of regulation allows identification of direct and indirect effects of the proposed regulation. The balance of costs and benefits must show whether regulation is welfare enhancing or not. This regulatory impact assessment focuses on the investigation of the principal effects of EMIR. The next chapter presents a Cost Benefit Analysis aimed at quantifying costs and benefits in order to estimate the order of magnitude of the potential welfare effect.

[28] For all clarity: this implies a partial analysis of EMIR, focused on the energy sector – as is the subject of this research. It is possible that whether or not to implement EMIR in the energy sector, as part of the full scope of EMIR, influences welfare effects of implementing EMIR in other sectors. This thesis is out of scope for this research project. Furthermore, the analysis is limited to *economic* impact. For instance, the European Commission also assesses *social* and *environmental* impact as part of its RIA's.

5.1 Benefits

In terms of intended benefits, goals of EMIR are twofold. First, it aims to improve transparency of OTC derivatives. Secondly, and in line with the first goal, it intends to decrease uncertainty and thereby mitigate risk to financial stability by obligating clearing of derivative transactions.[29] First and foremost, it should be assessed whether these benefits are indeed expected to materialize in the energy sector. In addition, there might be unintended benefits that need to be taken into account.

5.1.1 Transparancy

OTC transactions are mostly privately negotiated and closed between two parties. This raises the question whether the functioning of OTC markets is hampered by a lack of transparency. According to the representatives of the sector, to a large extent OTC trade is conducted via electronic screen trading such as Trayport. This makes the price formation of the OTC market highly transparent for anyone connected to this system. The issue of market transparency remains for OTC deals conducted outside Trayport with non-structured OTC contracts as a prime example. Here the question is whether regulation is needed to improve market transparency with a view of improving the functioning of this derivative market.

Given the nature of the OTC market, this question cannot be assessed in a general way. Transparency on fundamental data (as made obligatory under the Third EU Energy Package) is very important, but most other data is likely to have a smaller impact on market functioning. Especially in markets with a high level of transparency the cost and benefits of extra transparency have to be assed. Increased transparency is not what economists call a 'free lunch'. Its benefits in terms of improved market functioning need to be balanced against the costs of the regulation needed to establisch greater market transparency.

Moreover, there looms the risk of excessive regulation: different types of regulation all aiming for the same objective, increased market transparency. This risk of excessive regulation is realistic in the case of energy derivative markets, given the parallel scope of the Third Energy Package, Remit, EMIR and MiFID, all containing specific types of rules for increased transparency of financial activity on derivative markets. In theory, this regulation may generate a social benefit, but the questions remains at what cost.

5.1.2 Financial stability (indirect systemic risk)

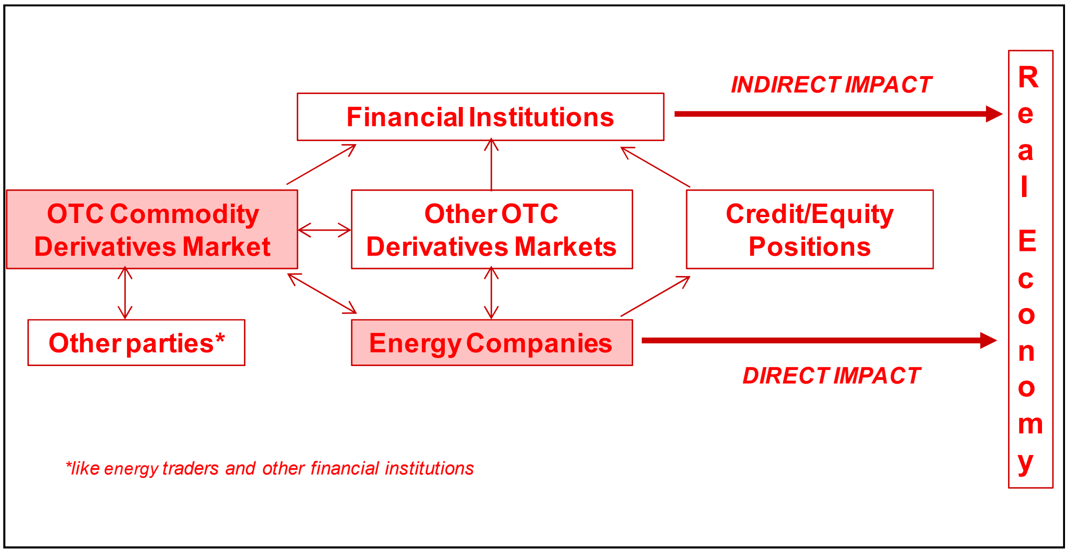
Although not explicitly defined as such in EMIR, risk to financial stability refers to systemic risk stemming from the financial sector.[30] In the context of this research it translates to the risk that financial institutions, due to their activities in the energy commodity derivative market, might run into problems or face rapid deterioration of already weak financial conditions. As a short recap of Chapter 2.6, Figure 5.1 illustrates the channels of systemic risk starting from the subject matter of

29 It is assumed that central clearing parties are regulated so as to prevent a shift of systemic risk to the CCP's in view of centralization of risk in a few number of parties.

30 As explained in Chapter 2 risk is part of everyday business and does not require regulation as such. If risk might have external effects through contagion to the real economy, that is: systemic risk, regulation might be appropriate.

this research, i.e. OTC commodity deriviative trade by energy companies, and positions this in the broader perspective of other relevant (related) channels. The objective of EMIR to mitigate the risk to financial stability refers to the potential 'indirect impact' from energy companies and/or the OTC (energy) commodity derivatives market to financial institutions, and subsequently to the real economy. Benefits of EMIR in terms of mitigating risk to financial stability clearly depend on the extent of systemic risk caused by the energy sector and its trading in OTC derivate markets.[31]

Figure 5.1 Systemic risk – contagion channels



Source: SEO Economic Research

Chapter 2 identifies the following aspects associated with the indirect channel:

- *Credit and equity risk through participation and lending activities*: the risk that failures of energy companies pose problems for financial institutions based on credit and/or equity positions. Theoretically, this risk is covered by the regulation for the financial sector itself, as it principally affects the balance sheet of financial instutitions.
- *Counterparty credit risk – direct exposure*: the risk that energy companies cannot fullfil counterparty obligations as part of derivative transactions resulting in problems for financial institutions. This risk could be reduced by central clearing. Also for this aspect risk-weighted solvency requirements (see Basel) would be in scope. Furthermore transparency requirements are closely linked with this risk factor.
- *Counterparty credit risk – indirect exposure*: the risk that financial institutions face problems, or the deterioration of existing problems, due to their positions on the energy commodity derivative market besides direct counterparty credit risk. For instance because failures of companies on the market cause adverse (price) developments. Clearing would only solve this problem to some extent. Failures may still result in price/spread movements as they influence the value of underlying commodities.

31 Regulation of the indirect impact via credit/equity positions would most logically be in line with the broader regulation of credit/equity positions of financial institutions.

The question is whether systemic risk via these channels is substantial, whether the risk for financials of trading on energy commodity derivative markets is comparable to other commodity markets covered by EMIR and whether EMIR would decrease risks in a sufficient manner.

Chapter 2 concludes that there are currently no theoretical or practical methods for policy makers to unambiguously determine if (or: when) OTC derivatives trade by non-financial institutions poses systemic risk, based on qualitative or quantitative indicators. What is left is a more conceptual discussion: *could* trade in the OTC commodity derivative market by the energy sector pose systemic risk? This depends on the share of OTC energy commodity derivate positions in total activities of (a group of) financial institution(s) and the systemic importance of the financial institution(s) in question. The lack of transparency of OTC transactions prevents insight in exact positions of financial institutions. Based on market analysis, interviews with energy companies and data provided by energy companies, Chapter 2 concludes (a) that OTC *commodity derivative* transactions constitute only a very small part of total derivative trade (approximately 1%) and, within commodity derivative transactions, (b) that only in a relatively small part of *energy commodity derivatives* deals financial institutions act as counterparty to energy companies (approximately 10-30%). In other words: current positions seem relatively low.

Besides direct positions between counterparties, the mechanisms of OTC derivative trading itself also potentially contribute to systemic risk, as evidenced during the recent financial crisis. Again, the exact impact of specific OTC derivative markets (like FX, CDS, commodities) depends on the involvement of financial institutions on these markets. The problem regulators face is that positions of financial institutions in the various derivative markets may change over time. Clearing of all OTC trading therefore seems an 'easy' and effective solution.[32] At the other end of the spectrum, the question arises what to do with a derivative market in which financial institutions do not have any, or negligible, positions? The only risk is that there would be spillover effects towards other derivative markets; but this seems a weak basis for regulation.

This is exactly the challenge in the discussion on systemic risk stemming from OTC (energy commodity) derivative trading by the energy sector. Their contribution to total systemic risk is currently negligible and benefits of EMIR regulation thus small, but this can change in the future. It is hard to make the case that there is no chance whatsoever that systemic risk can become an issue in the future, and thus that potential benefits of EMIR are nonexisting. This is not to say that including energy companies in the scope of EMIR, as part of regulating the broader OTC derivative markets, is the best solution. This should also be seen in the light of the characteristics of OTC derivative trading by energy companies. A large part consists of hedging transactions, which relate to physical underlying commodities. Financial institutions lack the specific motive of energy companies in participating in this market, which is the need hedge the risks of their physical operations: production and retail supply of energy. This may explain the current limited share of financial institutions in this derivative market. No evidence was found that the characteristics of this market are expected to change towards a higher dependence on financial institutions.

32 Although it is questionable whether central clearing would (fully) prevent acceleration of financial problems by derivative markets as evidenced during the start of the financial crisis.

5.1.3 Other benefits: decreased price shocks (direct systemic risk)

Speculators causing price shocks is a hotly debated issue, not only in the energy sector but also regarding food prices. A more general question is whether financial acitivities lead to price shocks and, if so, whether this merits government intervention. In terms of market failures, this question refers to systemic risk as an external effect: prices deviating from fundamental or price shocks can have harsh repercussions on the real economy.

The question here is thus if OTC commodity derivative trade by the energy sector poses direct systemic risk to the real economy. Chapter 2.6 concludes that financial activity on energy derivative markets can temporarily force energy prices to depart from the efficient price based on fundamentals and therefore increase volatitily. Their activity could therefore have a negative external effect on the economy, because energy price shocks and volatitily will hamper economic growth. However, the extent to which financial activity can cause price shocks appears to be limited, both in size and in time.

5.2 Costs

5.2.1 Clearing costs

In a world without EMIR, derivative traders decide whether or not to clear transactions. In practice, most OTC transactions are not centrally cleared. Buyer and seller in non-cleared OTC deals together decide whether and to what extent risks are mitigated via margins. According to information of the sector, it is common practice that counterparties have to put up variation margins for non-cleared OTC contracts. In terms of costs, an obligation to clear – for counterparties that exceed the clearing threshold – obviously has consequences.

A first difference is the fees payable for acquired services from the clearing house, the clearing fees (and possibly exchange fees when traded on an exchange). Second, total margin requirement may differ. Although the exact margin requirements can deviate between non-cleared OTC transactions, they will normally be higher than when a transaction is centrally cleared. Clearing implies initial margins and variation margins with daily mark-to-market (mostly) to be settled by cash, whereas the margin requirements in case of non-cleared deals mostly start from a threshold and are not settled mark-to-market. Margins, i.e. money posted at counterparties (net from money posted *by* a counterparty) or at a clearing house, have a cost: interest payable if the money is borrowed or opportunity cost if internal funds (i.e. equity) are used.

Finally, counterparties must have money ready if future price changes result in additional variation margin to be posted – mostly this is solved by stand-by credit facilities for which commitment fees are payable. Again, costs will be higher if transactions are cleared in view of daily mark-to-market resulting in higher (potential) volatility of margins. Table 5.1 illustrates the difference in cost components between cleared and non-cleared transactions.

Table 5.1 Costs OTC transactions substantially smaller when not-cleared than when cleared

Type of cost	OTC-cleared	OTC-not cleared
Exchange fees*	No	No
Clearing fees	Yes	No
Capital cost	Initial margin Variation margin -buyer&seller -mark-to-market -daily -cash or accepted security	Margins depending on exact agreement, usually: -only loss-making side -above threshold -not automatically
Credit commitment fee	In line with potential volatility of margins	Possibly, depending on exact agreement

Source: SEO Economic Research; *exchange fees are relevant when trading on an exchange, other costs of exchanges are roughly in line with OTC-cleared

Higher costs, whether for clearing or for reporting (see below), might result in higher energy prices. This depends on the market power of energy companies giving them the opportunity to translate cost increases to market prices. As this is a redistribution effect, it is not separately included in the Cost Benefit Analysis in the next chapter.[33]

5.2.2 Reporting costs

EMIR requires that all derivative contracts are reported to a trade depository. All contracts, modification and termination have to be reported no later than the next working day. The exact technical standards specifying the format of reporting are not definitive yet, but it is safe to conclude there will be costs involved.

5.2.3 Risk mitigation technique costs

Counterparties that exceed the clearing obligation and trade in (non standardized) contracts that are not cleared, must employ requirements of specific risk mitigating techniques. Depending on the interpretation of the text of the regulation, this may also apply to transactions below the threshold.

Costs may be divided into two categories: costs for risk management activities on the one hand and costs for collateral on the other hand. The first refers to activities like identifying disputes and monitoring the value of outstanding contracts. Part of these activities may already take place, and part will be new. Only the latter category results in *additional* costs of the regulation.

The second primarily refers to the requirement to daily mark-to-market outstanding contracts, which is mostly not done for non-cleared OTC contracts. Currently, it is a business-decisions of market parties to decide whether an OTC contract is cleared or not. The exact content of the requirements and exemptions (for mark-to-market) are still to be detailed.

5.2.4 Liquidity (and price shocks)

The main purpose of a clearing obligation is to reduce counterparty risk. As a side effect, obligatory clearing on energy derivative markets will increase costs for all market participants because the costs of clearing and the capital costs of margins will outweigh the current costs

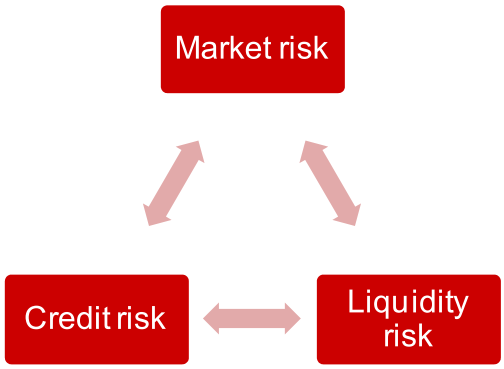
[33] In economic terms the net impact is nil, in social terms this might be different.

incurred by firms in their risk management of OTC trade. Commodity prices tend to be more volatile and show considerably larger swings than the prices of other financial products. Consequently, margin requirements will be considerably larger and margin calls much more frequent than with financial products, driving up the costs of trading (Ahn 2011). The same line of reasoning can be applied to the risk mitigation techniques described above, although impact will depend on the exact requirements. The higher costs can reduce the activity of traders, both of financials and non-financial firms. Reduced liquidity will hamper the efficient working of the market, increasing the probability of price shocks instead of reducing it.[34]

5.2.5 Limitations in risk management

Energy companies may hedge market risk via derivative transactions. This results in credit risk on the derivative counterparty, which may be hedged by means of clearing or bilateral margin agreements. Whether, and to what extent, this is necessary depends on the (net) position against a counterparty and its financial position. For non-cleared OTC contracts this, in turn, results in liquidity risk as both parties in the deal may have insufficient cash-potential to post required (future) margins.[35] Even if liquity risk can be handled, this comes at a price in the form of capital costs. Liquidity risk (costs) may be so substantial, that there exists a trade-off with market risk. Energy companies constantly analyze positions, counterparties and clearing costs in order to achieve an optimal risk position at lowest costs. This process of taking and managing risks based on the company's risk attitude and related costs is illustrated in Figure 5.2.

Figure 5.2 Clearing restricts options in risk management



Source: SEO Economic Research

A clearing obligation would imply that the degree of freedom within the risk management triangle is substantially limited. This means that a part of risk decisions will be suboptimal, as fewer options are available. The result is higher costs and (potentially) higher risk positions.[36]

34 The same argument would apply for energy firms if capital requirements would be imposed on them. Financial firms already have to meet capital requirements. Therefore their activities would not be affected by the introduction of this requirement.

35 In theory, also centrally cleared deals might pose credit risks. Here, it is assumed that CCPs will be properly regulated to prevent this.

36 A possible consequence of EMIR is that parties who hedge market risks through non-cleared OTC transactions will no longer do this because costs are considered to high. For a single company this may increase its risk position. Whether this is optimal from a welfare point of view depends on the systemic risk that is prevented.

5.2.6 Competition

EMIR will no doubt result in higher costs for companies trading in energy commodity derivatives. Also, risks for individual companies might increase due to fewer risk management possibilities. Possibly this is optimal from a welfare point of view (depending on benefits) but could result in a change in activities and even financial problems for individual companies. This can impact competition in the (OTC) commodity derivative market as well as in the energy market itself.

5.3 Conclusion: Impact assessment

This chapter discussed the potential benefits and costs of implementing EMIR. The first element of EMIR, central clearing of OTC derivative transactions, is primarily aimed at improving financial stability or – in term of market failures – decreasing systemic risk. Indeed, central clearing is an instrument to decrease counterparty credit risk and can thereby contribute to the reduction of systemic risk. The current contribution of OTC commodity derivative trading by the energy sector to systemic risk, however, is assessed as small in view of the small positions of the financial sector in these markets and as direct counterparty of energy companies. Whether this will change in the future, is hard to determine. What can be concluded is that the direction of the impact on potential systemic risk posed by OTC derivative trade by energy companies will be positive, but its exact effect relatively small – at least for now.

Cost of central clearing are substantial. Traders in energy derivatives will have to pay clearing fees and post substantially higher margins with the clearing parties compared to current collateral posting. Higher costs result in lower market liquidity, because market players will try to prevent these costs by decreasing trading activities. This, in turn, increases the likelyhood of price shocks and may decrease competition on the energy and derivative trading market. Finally, risk management options for energy companies diminish because it will be obligatory to manage credit risk via central clearing. This increases net risk for individual players and worsens the impact on market liquidity and competition. Evidently, higher costs must be compared to the benefits in terms of lower systemic risk to come to net impact on economic welfare.

The second element of EMIR, reporting requirements, are primarily aimed at improving transparency or – in terms of market failures – in decreasing asymmetric information. This is essential for proper market functioning and an element currently lacking in OTC derivatives markets. Via its impact on transparency, the reporting requirements are also expected to contribute to financial stability and decreasing price shocks. Costs mainly relate to the (additional) activities and (ICT) investments needed to provide the necessary information. As with central clearing, increasing costs may negatively impact on liquidity and the chance of price shocks, although these effects are not considered substantial.

In terms of costs and benefits, the last element of EMIR, application of predefined risk management techniques, closely resembles the analysis of central clearing. It will positively contribute to decreasing systemic risk, although this contribution is expected to be small for the moment. On the other hand, the requirements will imply new activities for energy companies, and it may have an adverse impact on liquidity, price shocks and the potential for risk management. Compared to central clearing, costs are expected to be smaller.

Table 5.2 summarizes the variables impacted by EMIR, resulting in economic benefits and costs. Some of these variables are quantified in a Cost Benefit Analysis in the next chapter.

Table 5.2 Regulatory Impact Assessment

Benefits					**Costs**				
Type	CC	Reporting	RMT	Impact	Type	CC	Reporting	RMT	Impact
Transparancy		X		+	Clearing costs	X			-
Financial stability	X	(X)	X	>0	Reporting costs		X		-
Price shock		X		>0	RMT costs			X	-
					Liquidity	X	(X)	(X)	-
					Price shocks	X	(X)	(X)	(-)
					Limitations in risk management	X		(X)	-
					Competition	X		(X)	-

Source: SEO Economic Research; CC = Central Clearing; RMT = Risk Mitigation Techniques; >0 = expected direction to be positive but impact small; (..) = uncertain outcome

6 Cost-benefit analysis

The introduction of EMIR in the energy derivative markets generates higher social costs than benefits and therefore has a negative impact on economic welfare in the Netherlands. This impact is estimated to be in total circa € 2,4 to 3 billion.

6.1 What is Social Cost-benefit analysis?

A CBA is a structured way of quantifying and aggregating all costs and benefits for society to compare policies. The aim is to find the policy that maximizes welfare. This is the social optimum. In theory many optimums are possible, given that generally different policies can be considered for achieving specific policy objectives.

A social CBA includes all effects in society. So external effects and unpriced effects are included in a social CBA while they are not included in a company's cost benefit analysis. Effects are calculated by comparing the situation in which a policy is implemented with a counterfactual without that policy. For a good analysis of course all relevant alternatives should be studied.

In Dutch infrastructure CBAs a distinction is made between direct and indirect effects (Eijgenraam et al. 2000). Direct effects are a direct consequence of the policy. Indirect effects are caused by or passed on direct effects. If they are passed on, the indirect effect is not additional. For example, if a public investment (for example in in a new road) lowers the costs, (for example for the transport companies using that road), the lower transport costs are a direct effect. The transport companies will pass on this direct effect to their owners (in the form of higher profits) and to their customers (in the form of lower prices). Counting both the direct effect and the passed on, the indirect effect would be a double counting of one effect.

A CBA aims to express all effects of a policy measure in terms of the same accounting unit, generally money. This assures a fair comparison of results and alternative approaches to policy. A strength of a CBA is that all the effects need to be formulated precisely. A related downside is that it is hard to determine how to use each factor in the CBA, such as the uncertainties related to quantifying the costs and benefits. Often many assumptions are necessary, which some see as a drawback of CBA. On the other hand a CBA requires that assumptions, which are normally left implicit, are now formalized. This facilitates critical scrutiny of the results. Also, often a sensitivity analysis at the end shows that only a few assumptions really matter for the sign of the outcome.

6.2 Benefits

Table 5.2 lists several potential benefits related to the extension of EMIR to the energy sector. These are:

- the benefits of increased transparency, which aids the functioning of the market mechanism,
- the strengthening of financial stability, and

- the prevention of price shocks.

Only the first factor is expected to generate real benefits in terms of an improvement of economic welfare. The impact on financial stability is uncertain at best and the same applies to the prevention of price shocks, which causes a reduction of the macroeconomic costs associated with sudden price changes. There is no clear estimate of the magnitude of the benefits of increased transparency, which means that we are unable to quantify this effect.

6.3 Costs

This Chapter focuses on the costs of implementing EMIR to the energy commodity derivatives markets. These costs have impact first and foremost on the energy sector, a direct effect in terms of the CBA-methodology. In theory, impact on the financial market is also possible, given that financial firms participate in this market. However, solvency requirements oblige major financial institutions like banks to margin virtually all their transactions in energy commodity derivatives, even without the introduction of EMIR to this market. The impact of this regulation on financial firms active on this market will therefore be small.

Energy firms are strongly involved in energy derivatives trading. Historically, OTC trading has been part of the energy market long before the energy exchanges emerged in the liberalized markets. Chapter 5 explained that mandatory clearing will have a major impact on what is generally considered a vital part of managing market risks on the energy market.

The most obvious and direct consequence of the introduction of EMIR to the energy market is the cost of mandatory clearing to energy firms. This chapter estimates the extra cost of mandatory clearing compared to the current situation, which allows firms to optimize their risk management system. Theoretically the decision to clear or not to clear depends on the credit rating of the counterparty, trust in the credit worthiness of this party, the investment portfolio, the cost of clearing versus the costs of an OTC deal without the need for central clearing and the need for liquidity. Mandatory clearing impedes the complex decision making process underlying the risk management system.

Chapter 5 introduced the costs involved in mandatory clearing:

- Clearing fees
- Initial margining causes credit cost of credit facilities needed to cover the margin;
- Initial margining generates an opportunity cost consisting of the foregone profit on the cash needed to cover the initial margin;
- Mark-to-market causes credit cost of credit facilities needed to cover the margin;
- Mark-to-market generates an opportunity cost consisting of the foregone profit on the cash needed to cover the variation margin.

This study estimated these costs for the Netherlands based operations of energy firms in the Netherlands. The cost estimates are based on confidential data from a representative set of firms in the Dutch market. Cost data of this CBA are only presented on an aggregate level to respect the confidentiality of the data used in our calculations.

The scope of this CBA is limited to natural gas and power deals. The data did not allow extension of the analysis to other energy commodities, like oil, coal and carbon. From this perspective this CBA underestimates the costs of mandatory clearing for the Netherlands-based operations of energy firms.

Table 6.1 presents the results for the baseline analysis of this CBA. This table explains the costs of compulsory clearing for two long term scenario's for the energy market. The costs of EMIR to energy derivatives lie between € 2,3 billion and € 3 billion, depending on the scenario. This cost is the net present value of the future stream of costs involved in compulsory clearing under EMIR. For the analysis the following approach was followed.

Table 6.1 Compulsory clearing generates high costs for energy firms in the Netherlands*

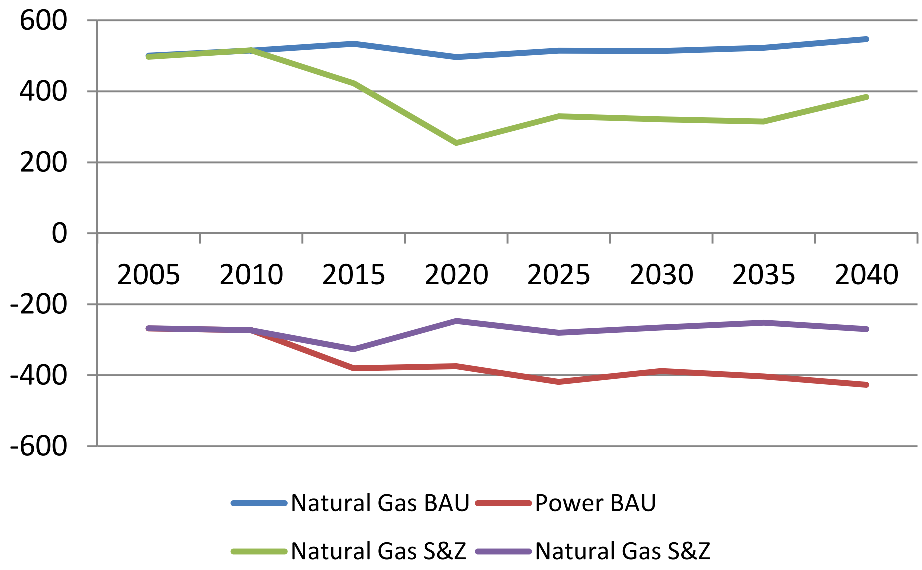
Cost of Central Clearing	**BAU**	**S&Z**
Exchange	186,2	140,9
Clearing	186,2	140,9
Initial margin		
Cost of credit	59,0	45,8
Opportunity cost	723,1	561,2
Mark-to-Market		
Cost of credit	118,1	91,6
Opportunity cost	1.756,2	1.362,8
Total cost	**3.029,0**	**2.343,2**

Source: SEO Economic Research
* All amounts in € mln

- Compared to the baseline without EMIR, the extension of EMIR to energy derivatives generates costs for every year after 2012, the proposed date for the introduction of EMIR. It is therefore assumed that in the baseline governments for ever abstain from introducing regulation aimed at compulsory clearing for energy derivatives;
- The calculation of the net present value is based on a discount rate of 5,5%, as advised in the official government supported guideline for CBAs in the Netherlands;
- The volume of transactions in natural gas and power futures and forwards is based on confidential information from energy companies. This CBA assumes that the growth of derivative trading by and large follows the patterns of the physical side of the market, the supply and demand for the actual energy commodity. The energy market scenario's of ECN (Energy Centre of the Netherlands) were used to forecast the future development of the

energy market.[37] The Business-as-usual (BAU) scenario forms the official 'reference' scenario used by ECN to evaluate Dutch government policies in the area of climate and energy. It assumes a standstill in the approach to curtail carbondioxide emissions and is based on the assumption of continued growth in energy demand and production. The S&Z scenario (after Schoon & Zuinig, the former Dutch government climate and energy program) aims at progressive decarbonization, which affects the demand and production of both natural gas and power. Figure 6.1 shows the growth rates for both scenario's in PJ for the period 2005-2040. The S&Z scenario implies a much slower growth of demand for energy as a result of increased investment in energy saving technologies. The pattern of slackening and strengthening of the demand for gas is explained by the introduction of CCS techniques after 2020, as foreseen by this scenario. A point not raised in this study is whether a higher market share of intermittent sources like wind energy actually raises the need to use hedging instruments. Information from the energy sector suggests that this will actually be the case. Figure 6.1 shows the energy balance of electricity generation, which explains the negative numbers for power.

Figure 6.1 Energy balance in electricity generation is strongly effected by future developments in the energy markets



The next step of the analysis translates projected volumes of trade in energy derivatives into exposure and the costs of clearing. Credit costs of initial margining and mark-to-market are based on confidential information and are not elucidated. Opportunity costs are evaluated on the basis of an estimated WACC which likewise is not elucidated, given that this information is confidential.

37 These are common energy scenario's in the Netherland, which has the benefit that sufficient numerical information is available, allowing calculations as performed in this study.

6.4 Sensitivity analysis

Table 6.1 presents a sensitivity analysis by calculating the impact of different energy scenario's on the costs of compulsory clearing. Given the uncertainty surrounding future development in energy markets it is customary to present results in terms of a bandwidth and clearly explain the assumptions on which it depends.

For this study alternative assumptions for compulsory clearing were tested. Table 6.2 presents the results of a threshold, exempting non-commercial hedging from compulsory clearing. Own account trading is estimated to apply to a majority of energy derivative trading of energy firms for reasons explained in Chapter 2.5. For the purposes of this study it is estimated to lie in the range of 70% to 90% of total trading. Table 6.2 presents a mid-estimate of the range. In this case the costs of compulsory clearing decline to a net present value of circa € 1,8 to 2,4 billion.

Table 6. 2 A threshold for non-commercial hedging lowers the costs of CC*

Cost of Central Clearing	**BAU**	**S&Z**
Exchange	149,0	112,7
Clearing	149,0	112,7
Initial margin		
Cost of credit	47,2	36,7
Opportunity cost	578,5	448,9
Mark-to-Market		
Cost of credit	94,5	73,3
Opportunity cost	1.405,0	1.090,3
Total cost	**2.423,2**	**1.874,6**

Source: SEO Economic Research
* All amounts in € mln

Another variable which may cause changes in costs of clearing is the number of CCPs operating in the European market. If transactions are cleared at different CCPs, the possibility of netting positions decreases. For this study the decline of the possibility of netting was estimated using an arithmetic formula relating netting to the number of CCPs. Table 6.3 and Table 6.4 demonstrate that an increase in the number of CCPs raises costs of compulsory clearing for energy firms up to a maximum of € 4,1 to € 5,4 billion for 10 CCPs in the European market. Table 5.2 shows that a single CCP in the European market introduces a specific market risk: what if this counterparty defaults? This risk is reduced if the number of CCPs increases, but Table 6.3 and Table 6.4 show that the downside of this reduced risk is higher cost of compulsory clearing.

Table 6.3 An increase in the number of CCPs increases costs*

Cost of Central Clearing	BAU	S&Z
Exchange	240,8	182,1
Clearing	240,8	182,1
Initial margin		
Cost of credit	76,3	59,2
Opportunity cost	935,0	725,5
Mark-to-Market		
Cost of credit	152,6	118,5
Opportunity cost	2.270,6	1.762,0
Total cost	**3.916,1**	**3.029,5**

Source: SEO Economic Research
* All amounts in € mln and the number of European CCPs is 3

Table 6.4 An increase in the number of CCPs increases costs*

Cost of Central Clearing	BAU	S&Z
Exchange	333,3	252,1
Clearing	333,3	252,1
Initial margin		
Cost of credit	105,6	82,0
Opportunity cost	1.294,3	1.004,4
Mark-to-Market		
Cost of credit	211,3	164,0
Opportunity cost	3.143,3	2.439,1
Total cost	**5.421,1**	**4.193,8**

Source: SEO Economic Research
* All amounts in € mln and the number of European CCPs is 10

6.5 Conclusion

For EMIR this study estimated the social costs and benefits to determine the overall impact on economic welfare in the Netherlands. The conclusion of this analysis is that for the Netherlands this welfare effect is negative with a magnitude of circa € 2,4 to € 3 billion. This conclusion is based on the calculation of the costs of compulsory central clearing to energy fims active in derivative trading. The costs of compulsory central clearing consists of fees needed for exchange and clearing. In addition credit cost and opportunity costs are made for the collateral deposited to cover the initial margin and mark-to-market (variation margin).

Confidential information from Dutch energy firms allowed us to estimate the costs of compulsory central clearing for the Netherlands-based operations of these firms. The costs are determined as the net present value of the cost difference with a continuation of the present regulatory framework without the obligation to centrally clear all OTC deals. This cost estimate is an underestimation of the actual impact. Derivative trading in coal, oil and carbon rights are excluded from the analysis due to a lack of data, but do form part of the trading activities of energy companies.

There are other social costs which are relevant for this cost-benefit analysis. This applies to the negative externality of the increased rather than reduced likelihood of price shocks are a result of a less liquid market. There is also a social risk involved in the focus on central clearing. What happens if a CCP defaults? The most likely scenario is that a CCP is too big to fail, just as is the case for the so-called systemic banks in the financial sector. Governments are likely to intervene to prevent a CCP from failing, shifting the welfare cost of this default to the taxpayer and society at large.

The costs of central clearing also depends on the possibility of netting exposure. This possibility is reduced if use is made of different CCPs. A calculation based on different numbers of CCPs shows that the welfare cost of central clearing may increase to circa € 4 to € 5 billion in case of 10 CCPs in the European market.

The costs incurred in central clearing have a counterpart which is the social benefit of the reduced likelihood of systemic risk in energy markets. This benefit cannot be estimated in an exact manner and is likely to be small. This explains why the sum total of social benefits and costs is dominated by the high cost of central clearing for energy firms.

A sensitivity analysis provides insight in the robustness of the result. Hence the cost-benefit analysis was performed for different economic scenario's, a business-as-usual scenario (BAU) with continued growth of energy consumption and production and a scenario for the energy market based on active climate programs, promoting energy saving and therefore reduced volumes of trade in the energy market. The sensitivity analysis shows that the actual cost of central clearing depends on the scenario, but that the welfare cost remains substantial in either case.

The conclusion of this study is that the compulsory central clearing for energy derivative trading, which is part of EMIR, generates a high cost in terms of economic welfare but low social benefits and is for that reason better not implemented. A study of alternative types of regulation may show if this welfare cost can be reduced, but this question falls outside the scope of the present inquiry and forms a highly relevant question for future research.

Appendix: Is there evidence in the energy sector for systemic risk?

This Appendix studies three cases of bankruptcies of firms active in energy trade. What was the impact of these bankruptcies for other energy or financial firms? Do the cases point at a possible explanation for these results?

ENRON

Position in the market

Following deregulation in the American energy market, Enron became a major player in the 1990's and stayed a major player until the end of 2001. Enron both bought and sold energy derivatives, being the counterparty for risk hedgers at both sides, thereby acting as a market maker. An important element for Enron was their website EnronOnline on which on average 6,000 transactions per day took place (Brunet & Shafe 2007, 16). It offered more than 2,000 products to traders and acted in 15 different currencies. It had become the 7th largest corporation in the United States and had an annual revenue of over $100 million in 2000 (CRS Report for Congress).

Enron's collapse

Enron's growth came to an abrupt end when the accounting fraud, in which the corporation had artificially increased profits, came to light. The corporation reported losses for the first time in the third quarter of 2001. In November 2001, it had revised earnings between 1997 and 2001 downward with $568 million, leading to a junk status of Enron corporate bonds at the end of November.

Consequences for energy- and financial sector

There was no contagion from Enron's collapse within the energy sector nor towards the financial sector. The congressional research service (CRS) wrote: *'Altough Enron's collapse appears to have had little impact on energy supplies and prices, a similar dealer failure in the future might damage the dealer's trading partners and its lenders, and it might set off widespread disruptions in financial and/or real commodity markets'* (CRS 2002). Also the energy companies themselves did not seem strongly affected. Comparing the share prices of other energy companies listed at the S&P[38] between 2000 and 2003, shows that they performed better than the S&P average.

In the financial sector, some actors had to write down a significant part of the exposure to Enron. JP Morgan Chase mentioned this exposure as one of the key challenges for the company

38 Duke Energy, AEP, CEG and PFN were taken into account. Only CEG performed worse than the S&P 500 average.

in the year 2002 (JP Morgan Chase Annual Report 2003, 4). The company still had an exposure of more than $ 600 million at the end of 2003. Citygroup had to write down $ 228 million in 2001 as a consequence of exposure to Enron. This amount was however only 1.6 % of net income for Citygroup. (Citigroup Annual Report 2001). Bank of America lost 2.6 % of its net income after writing down $ 210 million of Enron exposures. Bank of America wrote down another $ 283 million due to a detoriation of credit quality (Annual Report Bank of America 2001).

Conclusion

Enron's collapse did not lead to contagion within the energy sector or in the financial sector. This may possibly be explained by the fact that Enron acted as a market maker and not as the ultimate bearer of risk.

Lehman Brothers Commodity Services Inc.

Position in the market

Lehman Brother Commodity Inc. (LBCI) was a direct subsidiary of Lehman Brothers Special Financing Inc. and thereby an indirect subsidiary of the investment bank Lehman Brothers Holding Inc. All commodity derivative business of Lehman Brothers were executed through Lehman Brothers Commodity Services Inc. (annual report Lehman Brothers 2007, p. 55). LCBI acted as a broker, dealer, advisor and provided clearing services. LBCI was a clearing member at several energy exchanges such as the EEX. Net exposures of Lehman Brothers in general was limited as the company would often take the role of middleman (Alexander et al. 2011, 44).

Reason for collapse

LBCI suspended its trade a week before Lehman Brother Inc. filed bankruptcy in on September 2008. LBCI was not able to post sufficient credit cover and could not fall back anymore on Lehman Brother Inc. Lehhman Brothers Inc. was plagued by exposure of hard to value (mortgage backed) securities and consequently by plummeted trust from investors.

Consequences

The consequences of LBCS's collapse for energy firms were limited. The FPL group for example stated that Lehman's collapse would not have material adverse effects on the FPL group. FPL noted it did not have significant net exposure to Lehman Brothers (press release September 16, 2008 *FPL Group sees no material adverse impact from Lehman Brothers).* Also Alexander et al. (2011) writing for the European Parliament's Committee on Economic and Monetary Affairs, concluded that Lehman Brothers's collapse was not problematic for the energy sector as the firm did not act as the ultimate bearer of risk.

TXU Europe

Position in the market

TXU Europe was a separate corporate entity of TXU Corp. The firm had six power plants in the UK, six in Finland and one in Germany in 2001 (Annual Report TXU 2001) and traded also in Sweden, The Benelux, Germany, Switzerland, Italy and Spain. In 2001, it had already divested significant power production capacity in the UK and had become mainly active in trading in supplying to (industrial) consumers. In the UK, TXU Europe had a market share of 15% in terms of supplying electricity (Simmonds 2002, p. 88).

Reason for collapse

TXU Europe got into trouble after prices in the wholesale electricity market in the UK had in 2001/2002 declined 40% compared to a year earlier. Long term contracts with among others Drax brought the firm into the situation of having to supply electricity at lower prices than it had to pay to purchase the electricity (New York Times 2002, *2 companies make offer for part of TXU Europe*). On November 19, 2002, TXU Europe formally filed for bankruptcy.

Consequences

The counterparty mostly hit by the bankruptcy of TXU Europe was AES Drax Power Limited (Drax). Drax had a 17-year hedging agreement with TXU Europe. Both parties could end the contract in case the company would fail to post letters of credit (Marketwatch.com 2003). After the bankruptcy of TXU Europe, Drax had to find new buyers for 60% of its output (see annual report AES Corporation 2003, p 91). The contract price with TXU Europe was significantly higher than market prices at that time. As a consequence, Drax had to write down the net value of its assets with more than $1 billion (AES Coporation Annual Report). At the end of 2002, AES decided to sell its subsidiary Drax.

Another counterparty hit by TXU Europe's bankruptcy was Edison Mission Energy. After TXU Europe's bankruptcy, some of its plants were not operating. Markets prices had decreased in such a way that the operation of these plants were not profitable (Securities and Exchange Commission, Washington). In January 2003, Edison wrote down $ 100 million as a consequence of TXU's bankruptcy. Later in 2003, it sold all its UK based power plants. All operations in Europe were sold in 2004. Other companies as Scottish & Southern Energy had also significant but smaller exposures to TXU Europe.

Conclusion

Enron, LBCI and TXU Europe were all relatively big players on the energy derivative wholesale market. Yet, the consequences of their bankcrupty for other energy firms and the financial system appears to have been limited. This suggests that when big energy trading companies fail, neither the direct nor indirect exposure channels for market risk result in contagion. The explanation of this fact is that the links between such energy companies and financial institutions are of minor importance compared to the interlinkages between financial companies themselves.

The international financial system is so vast that the bankruptcy of an energy (trading) firm is a mere drop in an ocean of financial activity. So the economic consequence of such bankruptcies are felt by financial firms but do not affect the economic well-being of the financial community at large.

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