Deposit Insurance and Moral Hazard: An Analysis of Banks in the European Union

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Abstract: Current discussions at the ECB include a proposal of a European Deposit Insurance Scheme (EDIS). EDIS would become the third pillar of a fully-fledged Banking Union and the full implementation has been aimed for year 2024. However, previous research has found conflicting results regarding the effectiveness of deposit insurance schemes worldwide, as most studies have found that it creates adverse problems such as moral hazard, whereas Gropp and Vesala (2001) at the ECB found that national deposit insurance schemes decreased the risk taking of banks in Europe in the 1990s.

The aim of this thesis was to examine if explicit deposit insurance schemes seem to increase moral hazard in banks in the EU. The sample data contained of 67 banks from 1992–2016. A two-stage model was used to first predict values for Tobin's *q*, which represented bank charter values and then to measure the risk taking, together with charter values, deposit insurance indicators, balance sheet ratios and macroeconomic variables.

The first hypothesis that looked at the relationship between the implementation of explicit deposit insurance and leverage, asset and overall risk taking of banks, was rejected as results were insignificant. The second hypothesis looked at whether deposit insurance increases asset, leverage and overall risk of banks with low charter values more than those with high values. The second hypothesis showed significant results but since the relationships were inconsistent, the hypothesis was also rejected.

Keywords: deposit insurance, moral hazard, European Union, European banks, EDIS

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1 INTRODUCTION

During the last decade, many countries around the world have been heavily effected by systematic banking crises which can be very costly and challenging to recover from. In Europe, the debt crisis started in May 2010 and many Eurozone countries went through deep and persistent financial crises that resulted from both bad crisis management policies and a pre-crisis debt boom. Many effective decisions have already been implemented in the Eurozone to build a greater common safety net to make systematic breakdowns less likely. These include lender-of-last-resort facilities at the central bank, deposit insurance, strategies for regulating and supervising banks, and provisions for obtaining emergency assistance from multinational institutions, such as the IMF. (Baldwin and Giavazzi, 2015)

The concept of deposit insurance was harmonized in the European Union in 1994 and later in 2010 a common deposit coverage limit of 100.000€ per bank account per depositor was set in place. Later, the IMF established a limited form of deposit insurance in its best code practices. An explicit deposit insurance system is already in place in most countries globally. In fact, the number of countries offering explicit deposit insurance guarantees has risen from 12 in 1974 to 139 in 2017, with five countries adopting it in the year 2008 alone. (Demirgüç-Kunt and Detragiache, 2000; Demirgüç-Kunt and Kane, 2002; AIDI, 2017).

Even though deposit insurance has been created on reasonable grounds, it may still face many of the adverse problems also related to other insurance markets. The insurance industry is often a misunderstood industry and the way in which certain insurance contracts are priced to reduce many of the adverse problems in the industry. This paper does not aim to look at the contracts per se but instead at the governmentally created insurance scheme called deposit insurance, which has appeared to mitigate the occurrence of bank runs or crises. However, Merton (1977) noticed that when a country implements a deposit insurance scheme the risk taking of the banks in the country increases. This adverse effect is called moral hazard, which also appears in many other insurance industries.

Merton's discovery that deposit insurance leads to increased moral hazard has further been studied worldwide. According to research findings, when a country introduces insurance on bank deposits the banks start taking higher risks and in some cases, it could even destabilize the country's economy by creating an environment where high risk

taking banks can prosper. This could be explained by the fact that if the pricing of the insurance premium is fixed and banks can freely choose which projects to finance, where all projects have the same net present value, then the bank will choose those with the highest risk. This is because in fixed premium insurance contracts the premium is independent from the amount of risk taken by the bank. Another explanation is that when the customers of the bank have their deposits insured to a significant amount, they are not as likely to monitor their bank and notice or even concern themselves of an increase in risk taking (Garcia, 1998: 256).

The most recent, larger study on deposit insurance and moral hazard in respect to European banks was made at the European Central Bank (ECB), in which Gropp and Vesala (2001) found that the establishment of explicit deposit insurance significantly reduces risk taking of banks. This result contradicts most of the previous empirical findings and would mean that deposit insurance schemes have positive effects on the stability of the economy, as has been intended when implementing them. Other studies, e.g. Demirgüç-Kunt and Detragiache (2000), Anginer, Demirgüç-Kunt and Zhu (2014) and Wheelock and Wilson (1994), found that deposit insurance increases moral hazard.

In recent years, the ECB has also been discussing a cross-border deposit insurance scheme called the European Deposit Insurance Scheme (EDIS), which the ECB says, "…would mark an important step towards reinforcing financial stability by further weakening the link between banks and their national sovereigns and by delivering even greater trust in the safety of retail bank deposits, regardless of a bank's location in the Union.". A full European system of deposit guarantees is considered to be implemented in 2024, despite the fact that some Member States in the EU, including the German central bank (Bundesbank) and the Finnish government, opposes this new policy. (European Commission, 2015a: 1; Forsell, 2017)

The president of the Bundesbank, Jens Weidmann, said openly in an interview in 2015 that a cross-border deposit insurance scheme would be premature, since banks are still largely affected by national economic policy and national legislation (Hardie, 2017).

There are many interesting questions regarding the implementation of a cross-border deposit insurance scheme in the EU, one important being how to price the premiums to avoid increased moral hazard. This study also briefly touches the pricing mechanism of deposit insurance on a non-technical level.

To better understand the risk-taking culture of European banks and in relation to deposit insurance, this paper looks at deposit insurance and moral hazard in the European Union. The contradicting results from previous research and the current discussions at the ECB of a cross-border deposit insurance scheme forms the motivation for this thesis.

1.1 Purpose of the Study

The purpose of this study is to analyze if the implementation of explicit deposit insurance increases moral hazard in banks in the European Union.

1.2 Results

The results in this study indicate that explicit deposit insurance does not increase asset, leverage and overall risk taking of banks in the EU. Since the introduction of explicit deposit insurance had no significant effect on measures of the banks' risk taking it can be concluded that there is no significant relationship between the two. However, the results show that when the deposit insurance coverage in a country increases, asset and leverage risk also increase, while overall risk decreases.

The results further indicate that charter values do not significantly increase the three measures of risk. Lower charter values seem to increase leverage and overall risk taking, while decreasing asset risk.

The conclusion is that the implementation of explicit deposit insurance does not seem to increase moral hazard and this may be due to properly created insurance schemes or because Europe is already a developed economy. An important consideration is that before the implementation of explicit deposit insurance, each country had an implicit scheme in place. This might still mean that an implicit deposit insurance encourages moral hazard but an explicit one restricts such behavior.

1.3 Disposition

The paper continues as follows: chapter two discusses deposit insurance, the purpose of it and which factors affect the pricing of it. Chapter three presents theories for the adverse problems deposit insurance may face. The fourth chapter introduces the institutional background in Europe and presents EDIS in more detail. Different characteristics of deposit insurance schemes in Europe is also discussed in this chapter. Chapter five

discussed different crises in Europe from the nineties until today and further presents statistics over bank failures in the EU. Chapter six presents previous findings related to deposit insurance, increased risk taking and bank failures. Chapter seven goes through the methodology, the models used in this paper and the hypotheses tested. In chapter eight the data is analyzed, the descriptive statistics are presented and the different characteristics of banks in EU Member States are discussed.

Chapter nine presents the results for the tested hypotheses and discussed them along with earlier findings. The tenth chapter further discusses EDIS, together with the results. The final chapter concludes this paper and presents some further research topics. After the conclusion, a Swedish summary of this thesis follows.

2 DEPOSIT INSURANCE

Government deposit insurance schemes go far back in history and was developed in the United States by the Federal Reserve after the Great Depression bank panics in 1930–1931. Under these schemes each bank pays a premium to a deposit insurance fund and in exchange depositors have their deposits insured up to a fixed limit in case that their bank fails. Today, these kinds of schemes have been adopted with different modalities in 139 countries around the world and an additional 29 countries have such systems under development (AIDI, 2017). The insurance can be compulsory or voluntary, it can be implemented by one or by several funds, it can cover only principal or principal plus interest and the limits and conditions may differ widely. (Freixas and Rochet, 2008)

Banks are the most important financial intermediaries in most countries and since they are highly leveraged and maintain liquid assets, their portfolios are remarkably vulnerable to illiquidity and insolvency. There is also the risk that when one bank goes insolvent it can have a spill over effect and harm all the other banks in the country. This has lead to the establishment of deposit insurance, amongst other safety nets. (Demirgüç-Kunt, Kane and Laeven, 2008)

Governments and policy makers are usually in favor of explicit deposit insurances for multiple reasons, one being that their costs are less immediate than their benefits. In the short run, an explicit deposit insurance can in fact lower reported budget deficits. This is due to one-sided accounting and it makes deposit insurance look like a costless way of minimizing the threat of bank runs. In the long run, deposit insurances can have benefits such as protecting unsophisticated depositors and improving opportunities for small banks to compete with larger more transparent institutions. Deposit insurance can also ensure the stability of the banking system from systematic risk. (Khan, 2001; Diamond and Dybvig, 1983)

The huge cost of recent bank crisis has led to a continuing discussion about the reform of deposit insurance systems and the discussion has mainly been focused on insurance pricing. There is said to be three stands of governance for depository institutions: internal governance for owners, board of directors and managers; market discipline from depositors, other creditors and borrowers; and regulatory restraints imposed by the legislature and the regulatory agencies. An inadequately established deposit insurance scheme can restrict all three. The biggest pitfalls with a badly designed deposit insurance

scheme is moral hazard and adverse selection problems. These are discussed in the following chapter. (Khan, 2001: 3)

2.1 Mitigation of Bank Runs

From the standpoint of depositors, banks have the most basic financial assets that need to be redeemable into cash at any time. Deposit insurance has been established to prevent bank runs – a situation where a significant number of depositors want to withdraw their money from the bank at the same time – and they should help to stabilize the financial markets by not getting citizens worried in a time of crisis. (Stracca, 2018)

Bank runs are problematic since the bank does not in reality have such liquid assets that all deposits can be withdrawn simultaneously. In fact, it is essential for bank deposit management that deposit withdrawals do not have a perfect correlation and that the withdrawals are predictable in large numbers. This means that most banks do not have high reserves, and this makes them particularly vulnerable to a large number of simultaneous withdrawals. (Stracca, 2018) From a societal point of view it is in the end the depositors who will suffer since most of them will not recover their deposits in case of a bank run and without any insurance protection. Bank runs also disrupt the monetary system and leads to decreased productivity (Diamond and Dybvig, 1983: 401).

Banks are also highly leveraged and usually have a leverage ratio of 20 or more, comparable to other industries where it might be around two or three. Being highly leveraged also usually means that the returns for stakeholders are higher. Since banks are characterized by limited liability, which means that shareholders cannot lose more than they have invested, there is need for regulation, which have been established through minimal capital requirements. Capital requirements are ways for regulators to limit leverage and risk taking of banks. (Stracca, 2018)

The most famous bank run in history is the one during the Great Depression of the 1930s and it was ultimately due to this that deposit insurance schemes were created. When depositors know that their money is secured there is no need for them to withdraw their money, if they believe that the bank might go insolvent. However, as Diamond and Dybvig (1983: 402) explain, deposit insurance does not fully prevent bank runs as deposits are only insured to a certain limit and some deposits, such as Eurodollar deposits tend to be uninsured.

2.2 Pricing of Deposit Insurance

Even though this paper is not essentially about the pricing of deposit insurance schemes it is still valuable to go though the pricing mechanism on a non-technical level to also understand how the adverse effects of moral hazard could be mitigated. The schemes can have different features and regulation has also been implemented trying to create as fair premiums as possible. Deposit insurance schemes can be characterized by either private vs. public; fixed vs. variable rate (risk based) premiums; implicit vs. explicit guarantees; and ex-post vs. ex-ante funds.

2.2.1 Private versus Public Deposit Insurance

Deposit insurance schemes are usually public but some states like the U.S. have tried to adopt private insurance systems and the success of these have been mixed. A private insurance system has both its advantages and drawbacks. The advantage is that it provides competition, which provides incentives for information extraction and accurate pricing. The drawbacks are that it lacks credibility unless it is backed by the government, which in turn casts doubt on the incentives of deposit insurance funds to look for an accurate pricing of deposit insurance. Furthermore, since central bank interventions and closures of commercial banks are public decisions, private insurance schemes can function only if the government establishes explicit contingent closure policies, which can be very challenging. (Freixas and Rochet, 2008)

2.2.2 Fixed Rate versus Variable Rate Insurance Premiums

A deposit insurance scheme can, just like premiums in insurance markets, be based on a fixed rate or a variable rate, which is risk sensitive. Many countries have implemented fixed rate premiums but since these do not consider the riskiness of a bank it might give banks more tendency towards moral hazard behavior. By the end of 2017 the following countries in the EU had risk-adjusted premiums for deposit insurance: Finland, France, Greece, Italy, Hungary, the Netherlands, Denmark, Portugal, Romania and Sweden; while the rest of the countries did not (DAB, 2017).

When a country has a fixed, flat-rate premium, the annual premium is a flat percentage of total domestic deposits and does not reflect the risk profile of the bank. Levonian (1991: 1) proposes that there are three main issues with flat based deposit insurance premiums: one, flat-rate premiums support more risk taking from banks than is

economically desirable; two, safe banks effectively end up subsidizing risky banks, which can slowly change the characteristics of the banking industry since risky banks can succeed in that environment; three, the solvency of the insurance fund is more difficult to maintain with premiums that do not reflect the true risk-adjusted economic cost of deposit insurance since normally, insurance should reflect some kind of default (loss) probability of a bank.

Levonian (1991: 1) further explains that the insurer's economic liability can be based on two factors: how likely is it that the bank will go insolvent, which means that its capital falls to zero or below, and how low it will go before the bank files for bankruptcy. These both affect the loss that the deposit insurance fund is likely to have for a specific bank and these are not reflected in fixed rate premiums.

The risk-based premium can be compared to car insurance where less experienced drivers usually pay higher premium. According to Demirgüç-Kunt, Kane and Laeven (2014: 8) risk-adjusted premiums for deposit insurance are based on measures of the bank's solvency, liquidity and the efficiency of its internal control systems. E.g. in Greece, annual premiums are adjusted by a risk coefficient that ranges between 0,9 and 1,1, which is determined by the bank's placement into one of three risk categories by the Bank of Greece. Italy also has six different risk categories using four measures of bank risk and performance.

Even the risk-based premiums will never truly reflect the riskiness of the bank since many of the risks are difficult to quantify in a fair and true way. However, having risk-based premiums will get a fairer pricing and getting closer to the fair premium pricing model would be the ultimate goal when pricing deposit insurance.

2.2.3 Implicit versus Explicit Schemes

Before implementing an explicit deposit insurance scheme many countries had implicit deposit insurance schemes in place. If a country is lacking formal regulation through central bank law, banking law or other legislation, and the deposit insurance scheme does not have a specified beginning date, coverage limit, funding plan and design for solving bank failures, the country is seen to have implicit deposit insurance. If a country does in fact have laws in place and the above-mentioned features specified, it is said to have explicit deposit insurance. All EU countries have established an explicit deposit insurance scheme. (Demirgüç-Kunt, Karacaovali and Laeven, 2005)

2.2.4 Ex-post versus Ex-ante Fund

Deposit insurance schemes can be characterized by an ex-post or ex-ante insurance fund. According to Ognejenovic (2006: 371), ex-ante deposit insurance funding means that the regulator has decided to create an upfront cash fund for the purpose of deposit insurance. The fund can be created through different sources: initial capital at the time of the establishment of the fund and member fees; regular premiums paid; and additional sources such as borrowing from the market and/or budget, as lender of last resort. An ex-post insurance fund does in contrary not have funds created upfront and this is only created when needed for payout.

3 PROBLEM DESCRIPTION

As discussed in the previous chapter, deposit insurance schemes have been implemented worldwide as measures to stabilize the financial markets and bank runs. However, these schemes can still face many of the known adverse effects of insurance markets. This chapter explains why deposit insurance may lead to moral hazard or adverse selection. It further discusses why this leads to less oversight by depositors, which allows the bank to take on more risks.

3.1 Flaws in Designing Deposit Insurance

Deposit insurance differs in many ways from other insurance contracts (life, health, casualty etc.) as most insurance contracts assume that losses occur independently, which does not make the insurer particularly vulnerable to losses. However, most bank failures are usually not independent events, they occur in waves and usually result from a mistake made by the bank itself. (Garcia, 1998: 256)

Deposit insurance schemes also differ from other insurance industries in that it involves three different parties, while normal insurance contracts are between the policy holder and the insurer. If a loss occurs under a deposit insurance scheme it is not the bank that receives the money but the customer of the bank who has deposited cash. (Garcia, 1998: 256)

Some down sides of a badly designed deposit insurance scheme are agency problems, moral hazard and adverse selection issues. These are discussed more in detail below.

3.2 Moral Hazard

Merton (1977) was the first to notice the negative incentive effects of deposit insurance and he showed how deposit insurance encourages banks to invest in risky assets. This is called moral hazard and it is a term often used in the insurance industry and can arise in different scenarios, one of them being in the existence of deposit insurance. Deposit insurance can encourage depositors to choose a bank without concerning themselves about the business practice of managers. This then frees the managers and stockholders to seek out greater profits by investing in portfolios with greater risk than their uninsured depositors would be willing to accept. This greater risk taking is the moral hazard. The

importance of moral hazard has been stressed by many academics but underrated by policymakers.

Many countries have proper deposit insurance schemes, such as the Federal Deposit Insurance Corporation (FDIC) in the U.S., in some countries the government owns the banks and in other countries there is a general trust in that the government will intervene to guarantee depositors. E.g. there is a large believe that the U.S. government would take necessary actions to protect depositors in the event of a major default by banks that would bankrupt the FDIC. Merton talked about this believe in the seventies and this is exactly what happened during the 2008–2009 financial crisis when the U.S. treasury department intervened. The treasury department increased the FDIC limit for deposits to $250.000 per account and it also allowed them to tap into federal funds as needed through 2009 (Amadeo, 2017). This imposes a cost on the guarantor which is essentially the same as for explicit guarantees. Merton presents a systematic theory for determining these costs, which he establishes based on the unrelated theory of option pricing (Black-Scholes technique). With this theory, he further explains the moral hazard problem. (Freixas and Rochet, 2008) In an implicit guarantee it is usually the tax payers who will reimburse the banks in the end, which is not an ideal long-term solution, especially if moral hazard behavior exists.

3.3 Adverse Selection

The most famous origin of the theory of adverse selection comes from Akerlof (1970) when he explains the information asymmetry between buyers and sellers in the secondary car market. Later, Rothschild and Stiglitz (1976) highlight in their classical paper the challenges that adverse selection poses in the insurance industry. In their paper, they argue that it can be shown that a competitive equilibrium may not exist and that when equilibria do exist, they have strange properties.

Rothschild and Stiglitz (1976) suppose that there are two risk types, good and poor, with different probabilities of experiencing a given loss. The potential insurance customers are aware of their risk type and the insurer may not always be able to determine the customer's risk type. If the insurer then sets an insurance premium based on the average probability of loss, using the entire population as a support for this estimate, then it is possible that only the customers with the poor risk type will buy coverage. The customers with the good risk type will underpurchase coverage or buy no coverage at all, which may lead to a situation in which there is no competitive equilibrium. In such a situation, the

insurer will lose money or be forced to increase the premium to cover for all the losses of the customers with poor risk, who will still want to buy coverage. This leads to an inefficient market that is due to information imperfections.

Apart from information asymmetry, adverse selection also has two further assumptions. The first assumption is that risk aversion is distributed independently of risk, which means that the customers with different risk types are equally risk averse. The other assumption is that customers buy that insurance which maximizes their expected utility. However, these two assumptions may not be realistic. (Rothschild and Stiglitz, 1976)

Garcia (1998) explains that adverse selection can occur when a deposit insurance scheme is voluntary and charges premiums which are not risk-adjusted. Less risky banks will not want to take part in the scheme and when they withdraw from the scheme it creates a pool of more risky banks, which then again raises the premiums. In the end only the risky banks will remain until the system goes insolvent.

The classical model of adverse selection has been extended in many later papers. Stiglitz (1977) investigates monopoly, Crocker and Snow (1986) focus on categorization and Niinimäki (2000) shows how this theory can be extended to banking. Niinimäki explains that banks purchase insurance and pay a premium. However, when a bank failure occurs, the insurer does not pay to the banks or to the banks' shareholders but instead to the depositors. When banks have a self-selection mechanism in the coverage buying process, the high-risk banks will buy full coverage and the low-risk banks will buy partial coverage, which follows the original theory of adverse selection. The theory of adverse selection shows that the correct pricing and structuring of deposit insurance is vital.

3.4 Monitoring of Creditors

In this study, it is important to characterize three different types of risk – asset risk, leverage risk and overall risk. Asset risk is the risk taken on the asset side of the balance sheet, which can be the riskiness of a bank's loan portfolio where some banks might have a significantly higher ratio of non-performing loans than other banks. Leverage risk is the ability of the bank to compete for depositors and other creditors without acquiring additional costs due to higher leverage. A combination of both asset risk and leverage risk is referred to as overall risk. (Gropp and Vesala, 2001) Overall risk represents the standard risk measure in finance which is the volatility of the stock price. Whenever the

stock price is more volatile there is more uncertainty, which then again increases the risk of holding that stock.

In the illustration of the incentives to monitor banks under different safety net arrangements, four different levels of risk taking is given in the different risk-class types. These levels are referred to as low, medium, high and maximum. (Matutes and Vives, 1995)

Matutes and Vives (1995) suggest that the degree of moral hazard depends on whether the performance of the bank is observable. They show that if the performance of banks is not observable then the depositors cannot discriminate between banks and banks will then charge interest rates which compensates for maximum risk. The asset risk is maximized even without deposit insurance in this case.

In this analysis, it is assumed that the asset risk, leverage risk and bank performance are observable. In such a situation, if there is no deposit insurance, moral hazard is limited to the standard corporate finance case, which can be seen from section A in table 1. In such as situation, asset, leverage and overall risk will be limited since depositors will require compensation in line with the observable additional risk of the bank or take control of the bank. Without deposit insurance, there is an incentive for depositors to monitor the risk taking of banks since the deposits are ultimately in the hands of the banks and if these are not recovered in case of a bank run, the depositors lose their money.

Table 1 Balance sheet – No deposit insurance

A.		B.		C.	
Assets	**Liabilities**	**Assets**	**Liabilities**	**Assets**	**Liabilities**
Loans	Deposits	Loans	Deposits	Loans	Deposits
	Equity		Other debt		Other debt
			Equity	Charter value	Equity
Asset risk:	Medium		Low		Low
Leverage risk:	Low		Low		Low
Overall risk:	Medium		Low		Low

Source: Gropp and Vesala (2001)

Section B shows that the riskiness of the bank is reduced in the presence of other creditors. In the absence of deposit insurance, non-deposit creditors are important since they have an interest in monitoring excessive risk-taking of the bank. Large depositors have monitoring knowledge and resources, and therefore work as a safety net and

possess a threat to the bank as they have residual rights of control. Calomiris (1999) argues that the threat from subordinate bond holders is the key to effective market discipline. (Dewatripont and Tirole 1993a; Dewatripont and Tirole 1993b).

In section C, the effect of charter values on moral hazard and risk taking can be seen. Boot and Greenbaum (1993) show that charter values may reflect the reputation of a bank and Dewatripont and Tirole (1993a) say that it can function as a signal of good performance. Charter values means that the value of the company is visible, and it works as a limit since a high charter value prevents the conflict of interest between equity-holders and debt-holders. A bank's charter value is measured as Tobin's q in this study and it can be described as the present value of the stream of profits that a bank expects to earn when staying in business or the replacement cost of a bank (Furlong and Kwan, 2006). These are discussed more in detail in chapter seven.

If we consider a situation where a flat-premium deposit insurance is introduced into a country, the risk levels will be modified. The assumption for scenario two is that the introduction of deposit insurance will increase leverage, asset and overall risk taking of banks. This scenario can be seen in table 2.

Table 2 Balance sheet – Deposit insurance

A.		B.		C.	
Assets	**Liabilities**	**Assets**	**Liabilities**	**Assets**	**Liabilities**
Loans	Deposits	Loans	Deposits	Loans	Deposits
	Equity		Other debt		Other debt
			Equity	Charter value	Equity
Asset risk:	Maximum		Medium		Medium
Leverage risk:	Maximum		Medium		Medium
Overall risk:	Maximum		Medium		Medium

Source: Gropp and Vesala (2001)

When there is an explicit deposit insurance in place there is no incentive for depositors to ask for compensation for increased risk taking since their deposits are insured. Without deposit insurance, moral hazard is limited because depositors will demand higher interest for excessive risk taking. In reality it means that depositors will not look at the risk taking of banks but instead at other features when choosing a bank for deposits. (Garcia, 1998: 256)

In section A in table 2, the scenario of maximum risk taking by banks can be seen. This is a scenario where there are no debt-holders and no charter values available. Without

charter values, there are information asymmetries since the value of the bank is not observable. Section B and C are scenarios in which there are uninsured debt-holders and charter values. Since debt-holders are uninsured they still have an incentive to monitor the bank and the risk level decreases. Charter values reduce moral hazard by giving monitoring incentives to equity holders and depositors (Dewatripont and Tirole, 1993a). This can be seen when comparing table 1 and 2, even in the presence of debt-holders and charter values, the three levels of risk are still higher than in a scenario without deposit insurance.

A third scenario can also be considered, in which there is no deposit insurance but an implicit safety net. This scenario can be seen in table 3.

Table 3 Balance sheet – No Deposit Insurance but "implicit safety net"

A.		B.		C.	*Inssured with *p*
Assets	**Liabilities**	**Assets**	**Liabilities**	**Assets**	**Liabilities**
Loans	Deposits*	Loans	Deposits*	Loans	Deposits*
	Equity*		Other debt*		Other debt*
			Equity*	Charter value	Equity*
Asset risk:	Maximum		Maximum		Medium
Leverage risk:	Maximum		Maximum		High
Overall risk:	Maximum		Maximum		Medium

Source: Gropp & Vesala (2001)

In scenario three, there is no deposit insurance but instead a safety net where there is a probability *p* that all creditors will be compensated if the bank fails. This safety net can be an explicit guarantee, as was the situation in Finland before the introduction of deposit insurance. It can also be a general understanding by the public that the government will bail banks out, if they would go insolvent. This can be examined in the case of the U.S., which was mentioned earlier in this chapter, where the public has a perception that the government will do whatever it takes to rescue banks. This has also been proved to be the case in other countries, at least during the global financial crisis in 2008–2009.

Comparing table 2 and 3, when a situation with an implicit safety net is considered, the introduction of deposit insurance would reduce moral hazard. In the case with deposit insurance, depositors with deposits larger than the insured amount, uninsured depositors and other debt-holders will demand compensation for additional risk taken

by the bank. For deposit insurance to be a better alternative than scenario three, the banks must have non-insured creditors who are able to monitor the bank.

Gropp and Vesala (2001) suggest that deposit insurance would reduce leverage, asset and overall risk of banks more when a bank has high uninsured debt shares than if a bank has low uninsured debt shares. This can be seen when comparing table 2 and 3, the B parts to each other and the A parts to each other. Keeley (1990) says that in a situation in which a country has an implicit safety net, charter values would reduce the overall risk taking of banks. If a deposit insurance was introduced to these banks, they would not decrease their risk taking as much as others would.

4 INSTITUTIONAL BACKGROUND

The background of banking regulation and legislation in the European Union is presented in this chapter. How deposit insurances are constructed, what they cover and how recently they were established in the different countries in the EU is presented in this chapter. The European Deposit Insurance Scheme which is currently under construction, is also talked about in more detail since it will be discussed later after the empirical results.

4.1 Deposit Insurance Schemes in the European Union

All the countries in the EU have established an explicit deposit insurance system. Out of the 29 EU countries, four have more than one deposit insurance system in place. These countries are Austria with five deposit insurance systems and Germany, Italy and Portugal with two deposit insurance systems each. 14 out of the EU countries have deposit insurance institutions which are members of the International Association of Deposit Insurance (AIDI). In appendix 1, the specific features of deposit insurance systems in the EU countries can be seen. The first EU country to establish a deposit insurance system was Germany in 1966 and the most recent one was Malta in 2003. (AIDI, 2017; European Commission, 2015b)

Before the implementation of the directive of deposit guarantee schemes (Directive 2014/49/EU) in the EU countries in 2014, the coverage limit per bank per depositor could vary widely. For example, in 1998, Belgian banks only covered 15.000€ per depositor when Italian banks covered 103.291€ per depositor (Gropp and Vesala, 2001).

Before implementing explicit deposit insurance systems, some European countries had implicit deposit insurance systems that are called “survivors pay” principle, which is characterized by an ex-post insurance fund. This principle is based on direct government intervention to pay depositors, sharing the losses with the country’s other main banks. (Freixas and Rochet, 2008: 313). The original directive for deposit guarantee schemes from 1994 only required a minimum level of harmonization between domestic deposit guarantee schemes in the EU. Before 2007, most countries in the EU had a low deposit guarantee of 20.000€ per depositor (Engineer, Shure and Gillis, 2013). The directive from 1994 proved to not function properly during the financial crisis of 2007–2009. In 2009, the EU countries were required to increase their deposit guarantee to 50.000€ and later to 100.000€ by the end of 2010. This is currently the minimum amount that

should be covered by banks in the EU. The new directive also emphasized that bank failures should be resolved with funds provided by financial institutions and not by taxpayers. (European Commission, 2017a)

The deposit insurance schemes in the EU have premiums either based on the bank's risk or equal premiums for all banks. Ten countries have premiums based on risk and these countries are: Finland, France, Greece, Italy, Hungary, the Netherlands, Denmark, Portugal, Romania and Sweden. The new Directive implemented in 2014 requires a minimum of 0,8% of insurance fund resources. Many EU countries have national requirements that are higher than the level required by the directive. Croatia has the highest with 2,5%. Austria, Italy, Slovakia and Luxembourg still use the older, ex-post financing model. (DAB, 2017)

4.1.1 The European Deposit Insurance Scheme

The European Deposit Insurance Scheme (EDIS), which has already been briefly introduced was a proposal published by the European commission on November 24th 2015. EDIS would be a cross-border deposit insurance scheme of which at least all the Eurozone countries would take part of. The Single Resolution Board would oversee EDIS and it would also become the third pillar of a fully-fledged Banking Union. The European Commission (EC) states that as long as the current Deposit Guarantee Schemes remain national, Member States' budgets continue to be exposed to risks in their banking sectors. The EC also says that a European system would allow the risks and costs of financial shocks to be diversified across the different countries. The EC further says that the U.S. deposit Guarantee Scheme, in relation to the covered deposits, is more than three times that of the EU or the euro area and that they would prefer covered levels more like in the U.S. (European Commission, 2015b)

The EC also mentions a side effect with a harmonized deposit insurance system. They say that it would mean that some Members States would be insured at very large multiples of their GDP and other Member States would honor this guarantee unsupported. The EC has several possible options for implementing EDIS under discussion. These include a full replacement of the current system, a creation of a complementary 'top-up' euro area scheme, a reinsurance mechanism and a system of inter-Member State cross-lending. (European Commission, 2015b) These are discussed more in chapter ten.

Even though EDIS would bring several benefits to its Member States, especially concerning diversification of risk, it does not come without its pitfalls and challenges. Problems include i.e. moral hazard and free-riding behavior. The fairness of the system should also be discussed thoroughly before its implementation, especially since it can be considered that some Member States are in greater risk of bank insolvency and bank runs. Furthermore, as the different schemes in the EU are divided between risk-based premiums and equal premiums, this would also be a challenge in the decision-making process. There are also differences in the schemes concerning their administration, whether they are public or private, and some countries have multiple schemes in place, which creates even more challenges.

4.2 Directives and Financial Regulation

As differences and similarities of the national European deposit insurance schemes have been discussed, it is now important to consider financial regulation and deregulation as well as different directives, which have been implemented in the EU in recent history.

In a complete market, financial institutions would be unnecessary and irrelevant. However, asymmetric information such as moral hazard and adverse selection problems prevent markets from being fully efficient. Therefore, the EU has implemented several regulatory and legislative frameworks to improve efficiency and protect small investors and depositors. (Giovannini and Mayer, 1991)

In the 1970s, there was a shift in regulation when banking deregulation in Europe became popular and this trend continued through the early 1990s. During this time, controls of banks' deposits and lending rates, fees and commissions, as well as direct credit quotas and branching limitations were deregulated. This time also lead to a greater increase in banking competition and regulatory protection against national markets disappeared. (Canals, 1999).

In 1989, the European Community legislation contributed with a directive, which is referred to as the 2nd Banking Co-ordination Directive (89/646/EEC). This directive made it, on one hand harder for non-member banks of the European Economic Community (EEC) to compete on an EEC-wide basis, and on the other hand easier for EEC banks to compete in other Member States. This directive was an important step in banking deregulation in the EU. During the same time, the Member States also adopted

the Directives on banks' own funds (89/299/EEC) and required solvency ratios (89/647/EEC). (Gruson and Nikowitz, 1988)

In order to control for a functioning banking market under a deregulated environment, the European Parliament and the Council of the European Union established a Directive on Deposit Guarantee Schemes in 1994 (94/19/EC). The directive required banks to have a minimum deposit guarantee of 20.000 European Currency Units. Belgium, Ireland, Luxembourg and the Netherlands had coverage limits lower than the new required amount. Greece, Portugal and Sweden did not have deposit insurance systems before that and in connection with the directive they established such systems. Finland was the only EU Member State at the time, who did not implement an explicit deposit insurance system and did not do so until 1999. Later in 2014, the European Parliament and the Council established a new Directive on Deposit Guarantee Schemes (2014/49/EU), which was based on the old directive but a new fixed coverage level of 100.000€ was introduced.

4.2.1 Basel Accords

Currently, three Basel accords have been established as banking regulation and standards globally. The Basel Accords are not enforced legislation but are usually incorporated into national law. The first Basel Accord (Basel I) was issued in 1988 and it focused on the capital adequacy of financial institutions, mainly credit risk and appropriate risk-weighting of assets. Basel I required international banks to hold capital equal to at least 8% of their risk-weighted assets. The application of Basel I meant a greater parallelism between the banking standards around the world, but a demand of increased capital requirements could also have influenced banks' risk taking. In 1992, Basel I was enforced by law in the G-10[1] countries. In 2004, an extension of Basel I was introduced, called Basel II, with the intention to adjust international standards for capital requirements. (Basel Committee, 1988)

Basel II focused on creating rules that would ensure that banks with greater risk would be required to hold more capital (BIS, 2004). Basel II has also been criticized as partially being the reason for the sub-prime financial crisis that started in 2008 in the U.S., as it allowed banks to take on additional types of risk (Reich, 2011).

[1] Included the following countries: Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, Switzerland, United Kingdom and United States.

The most recent accord, Basel III, was agreed upon by the Basel Committee on Banking Supervision in 2010–2011. Basel III requires banks to fund themselves with 4,5% of common equity of risk-weighted assets. This was a much higher requirement than Basel II, which only required 2% of common equity. Basel III also introduced two capital buffers and a minimum leverage ratio. Some of the requirements of Basel III have not yet been fully implemented. (BIS, 2010)

5 FINANCIAL CRISES AND BANK INSOLVENCIES IN EUROPE

When discussing risk taking in banks it seems appropriate to also discuss financial crises. Banking crises are a worldwide phenomenon and a study by Laeven and Valencia (2012: 3) reported 147 banking crises since 1970, where many countries have experiences several of these during that time. They found that in 70 percent of episodes for which data was collected, a deposit insurance scheme was already in place in the country when the crisis erupted. Studies have also found that the during the years leading up to a financial crisis, risk taking is usually higher in banks.

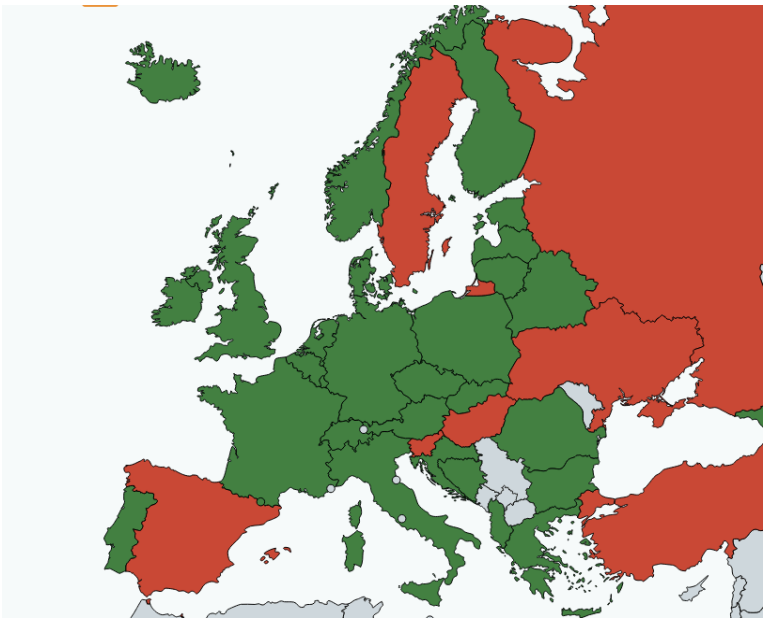
Acharya, Santos and Yorulmazer (2010) conducted research on how deposit insurance premiums could best be structured to account for systemic risk, which is the risk of extensive failure of banks and other financial institutions. They argue that during bank failure the deposit insurance fund takes over the bank and sells it further, but during systemic bank failures it is difficult to sell failed banks at attractive price since other banks are also then usually experiencing a crisis. They therefore argue that deposit insurance premiums should also include a factor that not only increases in relation to individual bank failures but also in relation to joint bank failures. The researchers further suggest that the premium for large banks should be higher per dollar of insured deposits compared with that for small banks since the failures of large banks lead to greater fire-sale discounts.

Anginer, Demirgüç-Kunt and Zhu (2014) studied deposit insurance during periods of financial crises and found that deposit insurance reduces the incentive for depositors to monitor banks which leads to excessive risk taking. However, during the crisis, bank risk is lower and systematic stability is greater in countries with deposit insurance coverage. This chapter will briefly discuss the different systematic banking crisis which countries in the EU have experienced during the studied time frame 1992–2016 and how they have changed some of the characteristics of deposit insurance schemes.

5.1 Banking Crises in Europe

Figure 1 shows the number of systematic banking crises in Europe throughout history. Green stands for one systematic banking crisis, red represents two, and grey countries in Europe have not experienced any systematic banking crises. The only countries to have experienced several banking crises in the EU are Spain, Sweden and Hungary.

Figure 1 **Number of systematic banking crises in Europe**



Source: Laeven and Valencia (2018)

The global financial crisis in 2007–2008 and the Eurozone crisis which started in 2010 have created most bank failures in Europe and these are discussed below. Further crises have appeared in Finland, Sweden and Hungary from 1991–1995, which also explains why Sweden and Hungary have been exposed twice. (Laeven and Valencia, 2018)

5.1.1 The Global Financial Crisis in 2007–2008

One of the most significant financial crisis in recent history is the global financial crisis of 2007–2008, which started with a crisis in the sub-prime mortgage market in the United States and developed into a severe international banking crisis.

The financial crisis started with losses in the subprime residential mortgage segment, which lasted from August 2007 to August 2008. Despite this disruption to financial markets, real GDP continued to rise into the summer of 2008 and forecasts were made predicting only a mild recession. In mid-September 2008, the crisis developed into a far more dangerous phase. On September 15 2008, investment bank Lehman Brothers entered bankruptcy which was the most significant event triggering the crisis to go global. Many factors can be seen as the trigger for the crisis but Mishkin (2010) emphasizes three further events that were almost as significant as the Lehman bankruptcy: the AIG collapse on September 16 2008, the run on the Reserve Primary Fund the same day, and the struggle to get the Trouble Asset Relief Plan (TARP) approved by Congress over the following four weeks.

After September 2008, the shadow banking system intensified and banks were unwilling to lend to each other. The European Central Bank, the Bank of England and the Federal Reserve tried to inject liquidity into the financial system but without much luck. This made the subprime crisis a global financial crisis. (Mishkin, 2010)

According to Laeven and Valencia (2012) countries in the EU which were affected by the the global financial crisis were not affected by it until 2008, except for the United Kingdom which already suffered from when it started in 2007. The countries in the EU that suffered from a systematic banking crisis were: Austria, Belgium, Denmark, Germany, Greece, Ireland, Latvia, Luxembourg, Netherlands, Spain, Ukraine and the United Kingdom. According to the classification for systematic banking crisis by Laeven and Valencia (2012), France, Hungary, Italy, Portugal, Slovenia and Sweden were borderline cases since only two listed interventions took place in these countries.

As a response to the crisis, countries in the EU had government interventions and they raised the coverage limit for deposit insurances, among other things, which meant that a harmonized limit of 100.000€ per depositor was introduced into all EU countries by 2010. Because of this, most EU countries had a significant raise in the deposit insurance coverage when it rose from 20.000€ to 100.000€ in most countries. One exception was Italy who already had a coverage limit higher than 100.000€ and therefore lowered the limit to the new harmonized limit. (Demirgüç-Kunt, Kane and Laeven, 2014: 43)

5.1.2 The Eurozone Crisis

A few years following the global financial crisis, when the Euro celebrated its tenth anniversary, many Eurozone countries materialized a full-blown financial crisis. The sovereign debt crisis that broke out in Greece at the end of 2009 can be traced back to many triggering events. However, the immediate reason for the crisis was the crisis of 2007–2009. During the beginning of the 2000s until 2007 speculative mortgage lending caused a recession and crisis. States tried to provide liquidity and capital in 2008–2009 to rescue banks. This, together with structural weaknesses of monetary union resulted in the Eurozone sovereign debt crisis. (Lapavitsas et. al 2010)

Codogno and Monti (2018) say that the global financial crisis touched specific weaknesses of the individual countries and the vulnerabilities of an unfinished European project. Spain experienced a collapse in real estate prices, Ireland a banking bailout, Greece had an unreported rise in the deficit and Italy got much attention as the

Eurozone's third largest economy. Italy had experienced poor economic performance in the years preceding the crisis and a very high debt-to-GDP ratio which made it particularly vulnerable. Codogno and Monti together with many news channels argue that the Eurozone crisis, at least in Italy, is far from over.

5.2 Historical Bank Failures in the European Union

Since this paper does not only measure the relationship between deposit insurance, moral hazard behavior and risk taking, but also discusses the implementation of EDIS in the European Member States, it is useful to get a picture of historical bank failures in the EU.

Open Economics (2018) keeps a database with bank failures in Europe and all the data presented below have been retrieved from there. From the data set the table below can be established. Table 4 shows the bank failures by country and the end date of the bank failure ranges from 1993 to 2013.

Table 4 Number of bank failures per country in the EU

Country	Number of bank failures	Year(s)
Austria	2	2008, 2009
Belgium	3	2008, 2011
Denmark	13	2008, 2009, 2010, 2011,2012, 2013
Bulgaria	1	1996, 1997
Cyprus	1	2011
Finland	1	2010
Germany	1	2009
Greece	6	2009, 2010, 2011, 2012
Italy	18	2008, 2009, 2010, 2011, 2012
Ireland	6	2009, 2012
Lithuania	1	2012
The Netherlands	2	2012, 2013
Poland	1	2011
Portugal	5	2008, 2010, 2012
Romania	11	1993, 1996, 1997, 1999, 2000, 2001, 2002, 2004, 2006, 2009
Spain	5	2009, 2010, 2011
Sweden	1	2008
UK	36	2008, 2009, 2010, 2011, 2012
Total	**114**	

Source: Open Economics (2018)

Certain patterns can be seen in table 4. Some banks in the EU seem, at least according to this database, to not have had many bank failures at all, while other countries have had

significantly many. Part of the statistics is affected by the fact that some countries were more heavily influenced by the last global financial crisis and the Eurozone crisis.

The country with the most bank failures is the UK, which might seem surprising given the fact that it has a very concentrated banking sector with only a few banks having a large part of the market share. However, this could also be seen as the reason for the failure of banks since if there are a few strong banks it might be difficult for others to compete and therefore survive. The UK was also very heavily affected by the crisis which started in 2007 and this lead to many banks going insolvent.

The country with the second most bank failures is Italy who in contrast to the UK, has many smaller banks operating in the country. Italy was also affected by the crisis and many smaller banks went insolvent or merged with other banks and it was further one of the major countries under crisis during the Eurozone crisis. Denmark also has, like Italy, many smaller banks operating in the country and it has also experienced the third most bank failures in the EU during that time period.

Romania has also had significantly many bank failures and many of them started during the crisis in Romania between 1990–1992 (Laeven and Valencia, 2012). Many of the bank failures in Romania were extended over multiple years after their crisis. The rest of the countries presented in table 4 have experience a couple of bank failures and most of them during the last global financial crisis or during the Eurozone crisis.

6 PREVIOUS RESEARCH

As the concept of deposit insurance has been around for soon one hundred years, research has been done to test the effectiveness of it. Studies have been done on markets worldwide, developed and emerging economies. Previous research has also been performed on both entire continents but also smaller studies on only a specific type of bank in a certain area. As discussed earlier, there has been conflicting results worldwide and this chapter therefore divides the previous research according to their results, studies indicating that deposit insurance increases moral hazard and studies that indicate that it might in fact not. The last part of the chapter summarizes the previous research in a table.

6.1 Previous Research Indicating Moral Hazard Effects

Demirgüç-Kunt and Detragiache (2000) were the first to use a cross-country database to study the link between deposit insurance and financial crisis by using panel data for 61 countries from 1980 to 1997. Deposit insurance became much more popular after 1980 and 40% of the countries had explicit deposit insurances in place in 1990. At the end of their study period, 33 of the countries had such in place. For their study, they had cross-country information about the date in which a formal deposit insurance was set up and the characteristics of the system, which were among other things, the extent of the system and how the system was funded. Their results showed that explicit deposit insurance tends to damage the banks' stability, increasingly so where bank interest rates are deregulated and the institutional environment is weak. They also found that the adverse impact of deposit insurance was extensive when the scheme is funded and run by the government instead of by the private sector. Finally, they found that economies with deposit insurances seemed to be more vulnerable to increases in real interest rates, exchange rate depreciation, and to runs that were triggered by currency crisis.

Thies and Gerlowski (1989) analyzed deposit insurance in the U.S. through history, going from the 19th century to recent decades. According to their assembled data, there has been a lot of problems with deposit insurance in the U.S. and mainly concerning reckless behavior by banks. In the 1980s, the U.S. had several court cases, in which one case even led to the president of the bank being sent to prison for criminal activity. They concluded that in the 80s, there was generally a negative picture of deposit insurances and the Federal Savings and Loan Insurance Corporation was continuously shutting down

insolvent thrifts. In the 1988, there were 7.350 bank and thrift cases under investigation by the FBI and federal grand juries in the U.S. The authors conclude that deposit insurance programs are not reformed; they fail. The situation has obviously changed since the analysis was made, but it is important to notice the significance of making sure that banks do not have the possibility to behave in a reckless manner.

Later, Wheelock and Wilson (1994) did an empirical investigation of deposit insurance and if implementation of such can lead to increased risk of bank failure. They argued that deposit insurance, at the time, was the most criticized government policy related to bank and savings and loan failures. The researchers used a model to estimate bank failure and the impact of insurance on the likelihood of failure. They also used a model for time-to-failure among banks. Their findings were that deposit insurance may increase the likelihood that a bank will fail. Furthermore, insured banks were less capitalized and in some years less liquid than uninsured banks. Capitalization and liquidity also seemed to be important determinants of bank failure.

Wheelock (1992a) and White (1984) both used a probit model to distinguish between failing and non-failing banks. Their results were similar, and they found that a bank was more likely to fail when the bank's capital-to-assets, surplus-to-loans, bond-to-assets, reserves-to-deposits or deposits-to-assets ratios were lower. Banks were also more likely to fail the higher their loans-to-assets and short-term borrowed fund-to-assets ratios were. Wheelock (1992b) further studied the effect of deposit insurance on bank failure and found that deposit insurance did significantly affect the probability of failure.

Alston, Grove and Wheelock (1994) used a different approach and studied why banks in the U.S. failed during the 1920s. They found that the only important factor except for bank size that affected failure rates during 1921–1925, was deposit insurance. Only eight states at the time, had deposit insurance systems and bank failure rates were systematically higher in states with deposit insurance systems and these worsened the impact of agricultural distress on bank failures. They said that deposit insurance discourages bank runs because depositors do not fear losing their funds in the event of bank failure. In the U.S., most bank panics schemes have failed particularly because they have removed the incentive for depositors to monitor the performance of their banks. The absence of monitoring by depositors encourage banks to undertake more risky investments than they would normally as was presented in the third chapter of this paper.

A recent study done by Liu, Zhang and Fang (2016), examined the effect of deposit insurance on banks' credit risk. They used a slightly different approach as they looked at forward-looking and market-based measures of bank credit risk, instead of backward-looking balance sheet ratios. They mainly used the credit default swap (CDS) spread. Data was collected for banks from 23 different countries around the world and they found that banks in countries with explicit deposit insurance systems have higher CDS spreads. This finding would support that deposit insurance increases risk taking and they argue that a full deposit insurance coverage only seems to stabilize bank risk during the financial crisis period. Almost all the countries in the sample were developed countries and 12 out of these were members of the EU. Positive effects from deposit insurance appears in the stabilization of volatile markets. They also emphasize that the unwanted effect of deposit insurance is more present in banks with low asset quality and low liquidity.

Kusairi, Sanusi and Ismail (2017) argued that if deposit insurance improves financial stability, then it will influence stability more generally. They tested whether the confidence level of depositors is affected in scenarios of potential bank failure in ASEAN countries. The also examined the implementation date of deposit insurance in the different countries and various effects of deposit insurance on the bank's asset structure. The findings were that deposit insurance does not increase depositors' confidence but instead, can make bank managers take on risky investments to compensate for additional costs that deposit insurance generates.

A study on deposit insurance and the stabilization of financial markets during times of crisis was done by Anginer, Demirgüç-Kunt and Zhu (2014). The researchers used a large data sample of 4.109 publicly traded banks in 96 countries during the crisis period from 2007 to 2009. The findings supported the theory of moral hazard, the overall effect of deposit insurance on bank risk over the full sample period was negative. The destabilization effect of the insurance was smaller during the period of crisis than during the period leading up to the crisis. However, good bank supervision can reduce the unfavorable effects of deposit insurance on systematic risk in good times.

6.2 Previous Research Opposing Moral Hazard Effects

The most important previous research for this thesis is a study by Gropp and Vesala from 2001. Their analysis is used as a support for this thesis. In their paper, they analyzed the relationship between deposit insurance, debt-holder monitoring, bank charter values,

and risk taking in European banks. Data was collected for 128 banks for the time frame 1991–1998. The researcher used a cross-sectional and a time series test for variation in the existence of deposit insurance schemes in Europe. Their results were that explicit deposit insurance significantly reduces the risk taking of banks. This result supports the hypothesis that in the non-existence of deposit insurance, European banking systems have been characterized by strong implicit insurance operating through the expectation of public intervention at times of distress. However, they pointed out in their study that the limit to the safety net must be credible for deposit insurance to work in a beneficial way. They also tested the hypothesis of interaction between deposit insurance and monitoring, charter values and "too-big-to-fail" values. For this hypothesis, the results were that banks with lower charter values reduce risk taking more after the introduction of explicit deposit insurance, which supports greater moral hazard when banks perform weakly. They also found that subordinate debt holders are able to monitor banks effectively. Finally, they proved that the introduction of explicit deposit insurance does not mitigate "too-big-to-fail" problems.

Karels and McClatchey (1999) examined the relationship between deposit insurance and risk-taking behavior within the credit union industry. Their study consisted of credit unions in Iowa (USA) after the implementation of deposit insurances for these unions. Karels and McClatchey did times series tests of the post-insurance period 1971–1990 and cross-sectional tests for 1972–1978 in their study, for which both tests resulted in similar outcomes. The times series results indicated that asset quality and liquidity improved during the post-insurance period. The cross-sectional tests suggested that even after adjusting for supply and demand effects, insured credit unions operated with more capital and generally greater liquidity than their uninsured counterparts. The overall results provided strong evidence that deposit insurance does not lead to increased risk-taking in the credit union industry.

6.3 Summary of Previous Research

Several studies have supported the theory of deposit insurance leading to increased risk taking, that is moral hazard, and that deposit insurance does not lead to a more stable banking industry. Other studies have found the opposite, having a deposit insurance policy in the country is beneficial for the banking sector and can prevent bank runs and liquidity problems. The contradicting results makes an interesting topic for further analysis. In table 5, the discussed previous research is summarized.

Table 5 Summary of previous research

Authors	Time frame	Geography	Results DI = Deposit insurance
Demirgüç-Kunt & Detragiache (2000)	1980–1997	Worldwide	Explicit DI damages the bank's stability
Thies & Gerlowski (1989)	19th–20th century	USA	DI programs have a history of failure
Wheelock & Wilson (1994)	1910–1926	Kansas (USA)	DI may increase likelihood of bank failure
Wheelock (1992b)	1920s	USA	DI did significantly affect the probability of failure
Alston, Grove & Wheelock (1994)	1921–1925	USA	Bank failures were higher in states with DI systems
Liu, Zhang and Fang (2016)	2001–2011	Worldwide	Banks with explicit DI systems have higher CDS spreads
Kusairi, Sanusi and Ismail (2017)	2000–2013	ASEAN	DI does not increase depositors' confidence
Anginer, Demirgüç-Kunt & Zhu (2014)	2007–2009	Worldwide	Effect of DI on bank risk was negative
Gropp & Vesala (2001)	1991–1998	Europe	DI reduces risk taking of banks
Karels & McClatchey (1999)	1971–1990	Iowa (USA)	DI did not increase risk-taking in the credit union industry

The different results can partially be explained by the different geographical areas, different time periods and unique ways to study the effect that deposit insurance has on risk taking. However, it can be concluded that there have been periods when deposit insurance has had mostly negative effect in the U.S. but considering that its history goes back almost 100 years, improvements have surely been implemented to mitigate some of the negative effects. Developing economies also seem to show adverse effects from deposit insurance and these can partially be explained by weak institutional environments.

7 METHODOLOGY

This section describes the methodology followed in this thesis. As mentioned earlier in the literature review, the methodology follows the study by Gropp and Vesala (2001) on European banks. The methodology for testing if deposit insurance increases moral hazard, the econometric models in mathematic form and the hypotheses are presented in this chapter.

7.1 Dependent and Independent Variables

The data consists of banks in the EU and by cross-sectional and time series variation in deposit insurances in these countries, it is possible to control for the effect of the existence of deposit insurance in the model.

To capture the effect of deposit insurance and indicator variable for when (year) explicit deposit insurance in each country was implemented, where zero signals no explicit deposit insurance and one signals explicit deposit insurance. Another indicator variable for deposit insurance is also used, this is for when deposit insurance coverage has been exceptionally high in a country. This indicator equals one when coverage is exceptionally high. Finally, to be able to measure the impact of deregulation, an indicator is used, which reflects the implementation date of the Community legislation through the second Banking Co-ordination Directive. This indicator equals one after the implementation date and implies that the liberalization should be modeled based on the Directive as a structural shift.

A bank's charter value equals the market value of its assets, which is calculated as the present value of the future expected earnings-to-dividends, minus the replacement cost of the bank, which can be e.g. the expense of rebuilding the bank from scratch. Therefore, charter values can be described as the present value of the stream of profits that it expects to earn when staying in business. (Furlong and Kwan, 2006) The charter value (CV) is divided by the book value of assets and expressed in the following way:

$$\frac{CV}{A} = \frac{E + L - A}{A},$$

E stand for equity and it is the stock price times the amount of equities outstanding. The market value is specified to equal the market value of equity plus the book value of banks' liabilities (L). Going concern is reflected in the market value of the equity, since the equity

holders are the beneficiaries, not the debt holders. The book value of a bank's assets (A) represents the replacement cost of the bank. Keeley (1990), Demsetz, Saidenberg and Detragiache (1996), and Gropp and Vesala (2001) also used Tobin's q as a proxy for a bank's charter value. The proxy measure has the benefit that it permits comparability across different bank sizes. It also directly reflects the extent of monopoly rents earned by banks due to pricing power. Tobin's q is calculated in the following way:

$$q = \frac{E + L}{A},$$

if a bank has pricing power in either loan, deposit or other markets, the market value of assets (E+L) exceeds their book value (A) and q then exceeds one. When q equals exactly one an uninsured bank has no pricing power.

Gropp and Vesala (2001) describe two problems with using q as a measure of banks' charter values. First, the book value of assets reflects historical costs, rather than current costs of assets. This means that ex-post q can diverge from one simply because asset return realizations may have been different from expectations, rather than as a reflection of market power. Second, q and risk taking may be simultaneously determined. In the empirical part, the charter value should therefore first be estimated as a function of deregulation and bank specific balance sheet variables. Then after, the model can use the predicted value from the first step as an explanatory variable in the regressions on bank risk taking.

Balance sheet ratios are also used to control for bank specific differences, including the share of demand deposits in total liabilities, the share of non-interest income in total reserves, and the share of loans in total assets. As a control variable the growth rate of assets is included.

7.2 Econometric Model

For the modeling regression, a two-stage model is used. One stage for charter values and deregulation, and one stage for risk taking. The first model is presented as following:

$$q_{jt} = \alpha_0 + \alpha_1 D_{it} + B_1 X_{1jt} + B_2 C_{1it} + \varepsilon_q, \qquad (1)$$

in which q_{jt} is the market-to-book value of asset ratio for bank j at time t, D_{it} is a set of indicator variables describing the deposit insurance system and the degree of

deregulation in country i at time t, X_{1jt} is a control variable unique to bank j at time t and C_{1it} is a country specific control variable. The dependent variable is Tobin's q. The indicator variables describing the deposit insurance system include a dummy variable signaling the presence of an explicit deposit insurance system and a dummy variable signaling if the insurance coverage was high. According to Garcia (1998) a high level of coverage gives rise to moral hazard. The control variable unique to banks are variables reflecting accounting ratios such as demand deposit share, loan share, share of non-interest income and the growth rate of assets.

The mathematical formulas for the different ratios can be viewed in appendix 2. The country specific control variables include values such as the stock market index, 10-year government bond yields minus the money market rate and the money market rate of the country. 10-year government bonds can be seen as the risk-free rate on the market and the money market rate is used for borrowing a lending in the short term. In model 1, the country specific effects are assumed to reflect country specific differences in regulation and competition, which are modelled to effect charter values but not risk.

The second-stage model is presented as following:

$$risk_{jt} = \delta_0 + \delta_1 D_{it} + \Pi_1 X_{2jt} + \Pi_2 C_{2it} + \delta_3 \hat{q}_{jt} + \varepsilon_{risk}, \qquad (2)$$

in which X_{2jt} and C_{2it} represent the same as in model 1 and $\hat{q}_{jt}$ represents the predicted value of q from model 1. Model 2 is tested for three different types of risk: leverage, asset and overall risk, and these function as the dependent variables in each regression.

Leverage risk is defined as the book value of liabilities divided by the market value of assets and it measures the degree of gearing of a bank. The higher the degree of gearing is, the riskier the bank is. Higher gearing can also show excessive competition for depositors. Asset risk is calculated as the share of problem loans in total assets. Overall risk of the bank is calculated by using the inter-day volatility of share prices. This volatility is defined as:

$$Sd_{tj}\left[Ln[P_d/P_{d-1}]\right]^*\sqrt{n}, \qquad (3)$$

in which Sd is the standard deviation for year t and bank j, P_d represents the stock price on day d and n represents the number of trading days. The volatility of a bank's stock price is an important indicator of risk since the higher the volatility of the stock price return of a bank is the riskier it is to hold the stock.

7.3 Least Square Models and Panel Data

This study uses panel data and those banks are only included for which the value of *q* can be calculated. The regressions are performed using a least squares model and a pooled ordinary least square (OLS) model has five main assumptions: 1. linearity; 2. exogeneity; 3. homoscedasticity and nonautocorrelation; 4. non-stochasticity; 5. no multicollinearity. The definition of these can be viewed in more detail from Park (2011: 7).

If cross-sectional or time specific effects do not exist, an OLS- produces efficient and consistent parameter estimates. However, if these do exist, heterogeneity, which means that the disturbances do not have the same variance, may influence assumptions two and three. This further means that an OLS estimator is no longer the best unbiased linear estimator. For panel data, there are ways to deal with these issues and these include accounting for fixed or random effects in the model. (Park, 2011: 7)

For cross-sectional and time specific effects there exist two different models, a fixed and a random model. The main difference between a fixed and random effects model is related to the role of dummy variables. In a fixed effect model the parameter estimate of a dummy variable is part of the intercept and in a random model it is part of an error component. Practically, fixed effects are tested in this study by performing the Lagrange multiplier test. This shows if there are significant cross-sectional or time specific effects. If the null hypothesis is accepted, then the pooled OLS regression is the best estimate. The Hausman's test is further used to compare a random effect model to its fixed counterpart. A significant result in the Hausman's test signals that a random effects model is more appropriate for the data. (Park, 2011: 8)

7.4 Hypotheses

The general hypothesis tested in this thesis is presented in the following way:

> *H1: The introduction of deposit insurance increases leverage, asset and overall risk taking of banks*

The null hypothesis is that deposit insurance significantly leads to increased risk taking in banks. The alternative hypothesis is that deposit insurance does not significantly lead to increased risk taking in banks.

If tables 1 to 3, from chapter three section four, are considered, one further hypothesis can be established that is tested with the regression. For model 1 and 2, the following additional hypothesis is tested:

> *H2: The introduction of deposit insurance increases the asset, leverage and overall risk of banks with low charter values more than the risk of banks with high charter values*

The hypotheses are tested in E-Views by using the econometric models 1 and 2 presented in the subchapter above.

8 DATA

In this chapter, the data for this paper is presented. Yearly data for banks in the EU is used from 1992 to 2016. Data were collected for all the countries in the EU for which the market values were available for the whole time frame studied, as it is necessary for calculating charter values.

The balance sheets and income statements of EU banks were assembled from Datastream. Since the model only uses ratios there is no need to have all data in a common currency. Only when gathering the descriptive statistic has the total assets been transformed into U.S. dollars since the euro currency had yet not been adopted in the beginning of the 1990s. The exchange rates were collected from Bloomberg.

In table 6, the number of banks per country for which market value data was found is presented. Most data were found for Danish banks and some EU countries did not have complete data for any banks for the whole time period.

Table 6 Number of banks per country, 1992–2016

Austria	4	Ireland	2
Belgium	2	Italy	7
Denmark	18	Netherlands	2
Finland	1	Poland	2
France	5	Portugal	2
Germany	4	Spain	3
Greece	6	Sweden	2
UK	7	**Total**	**67**

The banking systems vary in the different countries and some countries have a more concentrated banking sector than others, which heavily affects the number of banks per country. Since the time period is quite long, only stronger banks are in the data set, as all banks had to be active and listed for the whole time period. Data for a total of 67 banks from 15 different EU countries were collected.

The two stages of the model are analyzed using a generalized least square (GLS) regression. Since the risk taking of banks is measured with a two-stage model and predicted values of q, it should reduce endogeneity problems between q and measures of risk. The GLS-models in this study use either a random or fixed effects model. To see

which model is more appropriate the Hausman's has been conducted, for which significance indicates that a random effects model is more appropriate. The results for the Lagrange Multiplier and the Hausman's test for each regression can be viewed in appendix 3.

It is also worth mentioning that a GLS-model assumes a normal distribution in the sample means. However, the data set used in the study is large enough (1692 observations for 67 banks) to ignore the assumption for normality. The data set also consists of all banks in the EU for which data was available for the studied time period, which should further make the results robust.

8.1 Descriptive Statistics

The descriptive statistics are presented in table 7. It shows the mean, minimum, maximum and standard deviation for the values such as *q*, demand deposits-to-total assets, loans-to-total assets, non-interest income-to-total reserves and non-performing loans-to-total assets. *N* stands for the number of observations of each variable in the data set.

Table 7 Descriptive statistics for EU banks, 1992–2016

	Mean	Min.	Max.	St. dev.	N
Total assets ($K)	224.523.218	12.002	3.814.125.750	507.777.957	1692
Market-to-book asset ratio, *q*	0,91	0,01	1,06	0,11	1692
Demand deposits/total assets (%)	24,71	0,01	93,24	17,12	1164
Loans/total assets (%)	65,39	1,35	93,91	15,78	1578
Non-interest income/total reserves (%)	24,94	-52,11	91,66	14,60	1583
Non-performing loans/total assets (%)	2,94	0,00	58,43	6,26	816

From table 7, several things can be spotted. The bank with the largest amount of total assets is from the UK and the value is from the end of 2007. The bank with the smallest amount of total asset is an Italian bank from the end of 1992.

The Italian banking sector differs from many of the other banking sectors in the EU in that it has a much less concentrated banking sector. The Italian banking sector has a large number of banks and a small number of branches, and the system is dominated by local oligopolies. However, in the most recent decade, the Italian banking sector has

witnessed a large number of mergers and acquisitions in the banking industry. In 2012, Italy had around 800 banks in the country. (De Bonis, Pozzelo and Stacchini, 2012)

In contrast, the UK banking sector is heavily dominated by a few large banks and it has been argued that the UK banking sector is, in terms of market share, oligopolistic. In 2015, the five largest banks in the UK had over 87 % of the market share. This type of banking sector is also present in some of the other European countries. (Economicsonline, 2015)

To see the development of the different variables presented in table 7 a visualization can be made from appendices 4–7. The graphs include stacked lines of the development of each bank's variables and gives an indication of periods of decreases and increases.

In table 7, the value for *q* is presented and it has an average of 0,91 and most countries have an average over 0,90. From appendix 4 the development of *q* can be seen for 1992–2016. *Q* is rather stable during the whole time period and there does not seem to be a significant turn of direction during any year. It can be seen from appendix 4 that there is a slow upward trend in *q*. The standard deviation is also low, which would indicate that most values can be plotted around the mean. When *q* is under one it means that the company is in general undervalued by the market. The bank with the lowest *q* value seems to be an Italian bank that was significantly undervalued during 2000 and 2001. In 2002, *q* recovered to 0,92 again and the bank was only slightly undervalued after that. The bank with the highest *q* value is a Greek bank that seemed to be overvalued in 2011 and 2012. The bank has otherwise in general kept its value of *q* around the mean.

The average for demand deposits to total assets is 23%. The lowest value of 0,005% was for a Greek bank that during 1995 and 1996 had very low demand deposits. After year 1996, the demand deposits have slowly risen but the average for the bank is a little over 6% for the studied time period. When demand deposits are low it means that the bank might not have enough funds to cover for customer needs to withdraw their deposits. Appendix 5 shows the development of demand deposits-to-total assets over time. The graph shows significant jumps during certain time periods. The demand deposits ratio was generally highest during 1999 and then a significant decrease can be seen to year 2000. This is the time when the dot-com bubble burst which could have had an effect. There is also a significant decrease between 2007 and 2008 which could be due to another crisis. The demand deposits ratio does not seem to have fully recovered to that in year 1999 but it has increased since year 2007.

The average of loans to total assets is 64% and the minimum is 1,35%. The lowest value is for a Belgian bank which seems to have very low values between 1993 and 1998. The bank also has a much lower average (27%) than the total average. Appendix 6 shows the development of customer loans-to-total assets and the ratio has been very stable over time.

The average ratio for non-interest income to total reserves is 25% and the values ranged from -52% to 91%. Non-interest income can be seen as the bank's willingness and ability to diversify into non-lending, non-traditional activities and could therefore measure the bank's innovation ability (Gropp and Vesala, 2001). From appendix 7, the development of the ratio of non-interest income can be seen. It shows that there is an upward trend in the innovation ability of banks and the ratio has significantly risen from the beginning of the time period to the end. A large decrease can also be seen from year 2007 to 2008, which is due to the crisis. During a crisis banks do not tend to be as innovative as in normal times. They need to solely focus on recovering from the crisis and be more cautious with investment decisions. There is also a decrease between 2010 and 2011, which probably is an effect from the Eurozone crisis. The bank with the largest ratio of non-interest earnings is a Belgian bank that seems to have been innovative already in the beginning of the time period, when many of the other banks were not. The same Belgian bank also has the lowest observed value.

From these values and ratios in table 7 it can be seen that the characteristics of the different banks differ generally even though all the banks are listed on an exchange. The reasons behind the wide range of values could partially be because of the difference in banking systems in the different EU countries, but also because the data is collected from a longer time period, during which a lot of changes may have occurred on the financial market and the bank's own structure may have changed as well. The different countries also have different sizes of financial systems and the GDP of each country can vary broadly.

The biggest share of non-performing loans lay on the balance sheets of Greek banks. This is not only true for the time period studied but still remains the current situation in the EU today. The European Banking Association (EBA) measured that as of June 30^{th,} 2018 Greece takes the lead in non-performing loans (NPLs) with a ratio of 44,8% and Cyprus comes close behind with 34,1%. Most EU countries in the north stand at low levels and the Nordic countries such as Finland, Sweden and Denmark present low levels with 1,2%, 1,0% and 2,3% respectively. However, the statistics only contain large banks and would

this include smaller banks, then the ratios would be even higher. An analysis of the distribution of NPLs by bank size shows that the level of NPLs tend to be even higher in small banks. In stage 2 of the regressions, the share of non-performing loans to total assets measures the asset risk of the bank. (Magnus, Deslandes and Dias, 2018)

9 RESULTS

This chapter presents the results for this study. Regressions have been performed for both stages of the models (1 and 2). The first model is related to deregulation, deposit insurance, market indicators and balance sheet variables. The second model represents the risk taking of banks in relation to deposit insurance.

9.1 Deregulation and Charter Values

The first model used in the regressions mainly serves as a basis for producing predicted values for *q* in order to deal with endogeneity problems between *q* and measures of risk. Table eight shows the results produced by the first model. The value in parenthesis is the p-value for the coefficient above and the asterisks indicate significances on a one (*), five (**) and ten (***) percent level.

Table 8 Deregulation and charter values

	Variable	Coefficient
Liberalization	EC Directive implemented	0,02017
		(0,1265)
Deposit insurance	Implementation of explicit deposit insurance	0,02927
		(0,0052)***
	Deposit insurance coverage high	0,0062
		(0,0048)***
Balance sheet	Demand deposit share	-0,0175
		(0,0223)**
	Loan share	-0,0118
		(0,1724)
	Share of non-interest income	0,02738
		(0,0006)***
	Growth rate of assets	0,0065
		(0,0385)**
Market indicators	Stock market index	-0,0004
		(0,8969)
	Government bond yields – Money market rate	0,0036
		(0,0000)***
	Money market rate	0,0042
		(0,0000)***
Constant		0,8550
		(0,0000)***
R^2		0,11
N		787

The first finding, regarding the implementation of a EU wide de-regulation gives non-significant results. As Gropp and Vesala (2001) also conclude: it may be that this cross

boarded banking regulation only gradually has an effect, which would mean that the year of implementation does not affect banks right away.

Variables describing deposit insurance features are both significant. The presence of explicit deposit insurance in a country is positively related to charter values. When a country introduces deposit insurance the charter values increase. When the deposit insurance coverage in a country goes up or a country has high deposit insurance, the charter values tend to increase as well.

Table 8 shows that most balance sheet ratios are significant. Banks with lower demand deposit shares have higher charter values and banks that are more innovative – high non-interest income – have higher charter values as well. The share of non-interest income may also mean that banks with a more diversified business are more highly valued in the market. The growth rate of assets shows that when the growth rate is larger during a year, charter values also seem to be higher, which means that more rapidly growing banks have higher charter values.

The values for the money market rate indicates that when the return on the money market fund in a country is performing well the charter values increase. The results also show that when the yield curve is steeper charter values tend to be higher.

9.2 Risk Taking of Banks

The second stage of the model measures the relationship between risk and deposit insurance, which is the primary objective of this study. With the model, three different risk types are measured: leverage, asset and overall risk.

Table 9 shows the results from each regression with the different types of risk as dependent variables. Leverage risk measures liabilities divided by the market value of assets and asset risk is calculated as the share of non-performing loans in total assets. Overall risk is measured as the inter-day volatility of the stock price, which is a slightly different indicator for risk. Gropp and Vesala (2001) however discuss that inter-day volatility may not only be a sign of the riskiness of the bank but also reflect the liquidity depth of the market for its shares.

Table 9 Charter values, deposit insurance and risk

Dependent variable		Leverage risk	Asset risk	Overall risk
Deposit insurance	Implementation of explicit deposit insurance	0,0042	0,0389	0,0002
		(0,8208)	(0,1512)	(0,8638)
	Deposit insurance coverage high	0,0104	0,0457	-0,0005
		(0,0064)***	(0,0000)***	(0,0513)*
Liberalisation	EC Directive implemented	-0,0068	0,0334	-0,0018
		(0,4581)	(0,0981)*	(0,1013)
Charter values	Predicted *q*	0,1431	-0,2648	0,0044
		(0,0051)***	(0,0002)***	(0,0402)**
Balance sheet	Demand deposit share	-0,0056	0,04246	-0,0003
		(0,6521)	(0,0179)**	(0,5936)
	Loan share	-0,0260	-0,0077	0,0016
		(0,0534)*	(0,6967)	(0,0059)***
	Share of non-interest income	-0,01242	-0,0381	0,0023
		(0,3636)	(0,0709)*	(0,0010)***
	Growth rate of assets	-0,0092	-0,0215	0,0007
		(0,1409)	(0,0335)**	(0,1490)
Market indicators	Stock market index	-0,02787	-0,0079	0,0028
		(0,0000)***	(0,4217)	(0,0000)***
	Government bond yield – money market rate	0,0003	0,0140	-0,0001
		(0,0016)***	(0,0000)***	(0,0015)***
	Money market rate	0,0004	0,0126	-0,0004
		(0,7184)	(0,0000)***	(0,0000)***
Constant		-0,9071	0,1285	-0,0022
		(0,0649)*	(0,0962)*	(0,3645)
R^2		0,13	0,28	0,18
N		662	535	698

The results for the different risk types somewhat vary. The implementation of deposit insurance in a country does not seem to have any significant effects on risk taking. The lack of significance may be because many of the countries in the EU had already implemented explicit deposit insurance before 1992. However, when coverage is higher in a country there seems to be an increase in leverage and asset risk but a decrease in overall risk. This could indicate that a higher coverage level affects banks' balance sheets in one way and the volatility of the stock price in another way. What is worth noting is that most countries have had an increase in deposit insurance coverage from year 2008,

which was in the middle of the crisis. This could also influence the increase in some of the risk values.

The implementation of the EC directive, which created a more de-regulated banking environment in the EU, seems to have created an increase in asset risk. This might be because when banks are de-regulated and more liberalized to take on more risk it consequentially creates a higher ratio of non-performing loans. The de-regulation also meant more intense competition between banks in the EU, which could mean that banks started giving out loans more carelessly.

The dependent variable for asset risk is the ratio of non-performing loans in total assets and this is regularly focus points in discussions regarding banks' balance sheets in the EU. According to Magnus, Deslandes and Dias (2018) at the European Parliament, non-performing loans or NPLs are the main reason behind the low average profitability of European banks. NPLs have significantly risen from manageable levels before the financial crisis and a lot of pressure is now put on banks in the EU to reduce the ratio of NPLs on their balance sheets.

When looking at the charter values (q), higher values seem to significantly increase leverage risk while asset and overall risk decreases. It is worth considering that most banks have charter values that are relatively close to the average of the whole time period, and deviations mostly appear on the lower side. This might mean that when the book value of assets is closer to its market value the risks go down.

Banks with a higher ratio of demand deposit shares seem to have higher asset risk. When looking at the coefficients for the loan share to total assets an increase significantly decreases leverage risk, while increasing overall risk. This could be interpreted on the one hand as when banks give out more loans, which are represented on the asset side of the balance sheet, assets go up, which is the denominator in leverage risk, which then decreases the ratio. On the other hand, when banks give out more loans they also take on more risk that might increase the overall risk of the bank.

Also, when a bank goes more into non-lending business the asset risk seems to decrease. This can seem reasonable in that when a bank obtains earnings from non-lending business more as supposed to its lending business, there will also be a lower ratio of non-performing loans. The share of non-interest income further seems to significantly increase the overall risk of banks. This could be explained by the fact that when

companies take on new innovative projects the risk might increase as well. These projects can be a way for banks to earn non-interest related incomes and for the shareholders to take on more risk and benefit from higher returns.

The results also designate that when the growth rate of assets of a bank is greater there seems to be a significant decrease in asset risk. This could be explained by the fact that when total assets, which functions as the denominator in asset risk, increases, the ratio of non-performing loans to total assets will decrease, assuming that there is no increase or a smaller increase in non-performing loans.

When looking at the macroeconomic variables it is shown that the stock market index of a country seems to significantly affect leverage and overall risk. An increase in the stock market index seems to decrease leverage risk while it increases overall risk of banks. The money market rate has two significant values, but these are so small that that hardly have an effect at all.

9.3 Results for Proposed Hypotheses

Considering the results presented in the sections above, this part briefly discusses the proposed hypotheses earlier in this paper to see whether they can be accepted.

The first hypothesis, which says that the introduction of deposit insurance increases leverage, asset and overall risk of banks is rejected on the basis that it there are no significant values for the variable. The second proposed hypothesis, which says that deposit insurance increases asset, leverage and overall risk of banks with low charter values more than those with high charter values, is also rejected. The results in table 9 show that when the predicted value of *q* is higher, leverage risk and overall risk increases significantly while asset risk decreases. Since the relationships are not consistent the hypothesis is rejected.

The rejection of proposed hypotheses indicates similar conclusions as Gropp and Vesala (2001) found on the European market. Explicit deposit insurance might not create moral hazard and this could of course be due to properly created insurance schemes or other factors such as the fact that Europe is a developed economy. Like the results in Laeven (2001) and Demirgüç-Kunt, and Detragiache (2000), where the researchers found that explicit deposit insurance may harm a bank's stability but more so where the institutional environment is weak. It could be argued that the institutional environment is not weak

in the countries studied in this paper, which explains the positive outcome. Laeven (2001) found that a sound legal system and proper enforcement of rules reduces the adverse effects of explicit deposit insurance at least when looking at the opportunity-cost value of deposit insurance services.

Another important consideration is that before the implementation of explicit deposit insurance, each country had an implicit scheme in place. This might still mean that an implicit deposit insurance encourages moral hazard but an explicit one restricts such behavior, which was also presented in chapter three, table 2 and 3. This could also explain why previous studies on deposit insurance found that it increases moral hazard.

10 DISCUSSION

While the main goal of this study was to see whether explicit deposit insurance seems to increase risk taking in banks in the EU, it is also important to discuss the results in context to current regulatory and political discussions. As mentioned earlier, the EU wants to have a cross-border deposit insurance scheme, EDIS, implemented into EU countries by 2024. The results from this study would suggest that banks in the EU could benefit from EDIS and that it might not lead to excessive risk taking.

The results in this study bring additional robustness to the results in the study by Gropp and Vesala (2001) as the period has been further extended into the 2000s until recent time, with more countries and additional banks included. These results might indicate that the EU is ready for EDIS as long as it is properly priced.

EDIS has been discussed at EU level for some years now and opinions regarding it seem to differ from one politician to the next. However, genuine opinions can presumably be presented both against and for EDIS. It might be, as with many political decisions, that the goal of the scheme is certainly valid, but people do have concerns regarding some of the pitfalls that it has, and if these are not discussed and analyzed thoroughly then the effects of the new regulation may in fact be counterproductive.

10.1 Current Status of EDIS

The current discussion regarding EDIS has presented a three-phase implementation strategy where the first phase includes re-insurance, the second co-insurance, and the third full insurance. The re-insurance phase would apply for three years and it would mean that a National Deposit Guarantee Scheme (DGS) could access EDIS funds only after having used its own resources. EDIS funds would further only provide extra funds up to a certain limit. The European Commission (2015c) explains that in order to prevent moral hazard, a DGS could only benefit from EDIS if it has met its requirements and filled its national fund to the required level and only if those funds have been fully depleted. The second phase would mean that that EDIS contributes from first euro of loss and the contribution share would start at low level and progressively increase. As of 2024, EDIS would enter its third phase by insuring national DGS to full level. (European Commission, 2015d) The three-phase strategy is a legislative proposal and has yet not been agree on by the European Parliament and Council (European Commission, 2017a).

10.2 Solutions to Possible Adverse Effects of EDIS

Before implementing new policies and regulation, the EU usually thoroughly discusses these to see whether all aspects have been taken into consideration. The ECB has been discussing the adverse effects that EDIS could have on its members and suggestions have also been made by policy analysts on how to avoid these effects. The most serious disadvantages that EDIS could have are like those of national deposit insurance schemes, moral hazard and adverse selection, and according to Schnabel and Véron (2018) these could predominantly happen if a fully-integrated and country-blind EDIS is implemented. A couple of the suggestions made by policy analysts are discussed below.

10.2.1 Removal of Non-performing Loans

Schnabel and Véron (2018) proposes that EDIS would be more efficient while at the same time being part of a broader policy package by tighter treatment and removal of non-performing loans of the balance sheets of banks. Bénassy-Quéré et al. (2018: 20) calls this "the coordinated introduction of sovereign concentration charges for banks and a common deposit insurance". As discussed in the data chapter (chapter 8) non-performing loans still remain a huge problem in the EU and particularly for some countries, like Greece who currently has a ratio for non-performing loans of almost 45% (Magnus, Deslandes and Dias, 2018).

Schoenmaker (2018) says that when building a stable EDIS, it is vital that weak banks should not be allowed into the scheme before they have removed or done full provisions on non-performing loans. He says that a transition period would be required where banks would clean their balance sheets. The ECB should further be strict in its licensing and supervision of banks and the ECB could present though provisioning rules for EDIS.

10.2.2 Country and Rating Components for Pricing of Premiums

When discussing moral hazard issues regarding EDIS it could be fair that the premiums would have some kind of a risk component and that it would be different for different countries depending on how risky they are. Schoenmaker (2018) proposes that there could be a country risk premium which would be higher for countries with weak banking policies. These weak policies could be weak creditor rights, lengthy insolvency procedures, lax provisioning policies, or permissive housing finance. The premium would then be based on a bank-specific and country specific component. Further, the

risk premium should not be set by politicians but rather by the integrated Single Resolution and Deposit Insurance Board.

11 CONCLUSION

With the current discussion of EDIS and contradicting results from previous research concerning deposit insurance and moral hazard, this study aimed to look at whether explicit deposit insurance seems to have increased risk taking in banks in the EU. Panel data was collected for 67 banks located in the European Union from 1992 to 2016.

The results for the two-stage regressions (1 and 2) show that explicit deposit insurance does not seem to significantly increase risk taking of banks and therefore does not lead to moral hazard. These results are consistent with the findings in the study by Gropp and Vesala (2001), which was also conducted on the European market. However, the results in Gropp and Vesala's analysis found that deposit insurance did not only not increase risk taking but it actually decreased risk taking of banks. The results may indicate that the design of explicit deposit insurance schemes in the EU are done well and that explicit deposit insurance does not increase moral hazard, but implicit ones do, explaining the different results worldwide and also explaining why the risk taking would go down when an explicit model is introduced.

Notwithstanding the results from this study, it is still important to thoroughly discuss the possible effects EDIS could have on its members. The European Commission has made a proposal to integrate EDIS by 2024 following a three-step process. Schnabel and Véron (2018) and Schoenmaker (2018) discusses the importance of the removal of non-performing loans and the pricing of deposit insurance. The researchers also suggest that country and rating components should be introduced into the EDIS pricing framework to reduce moral hazard.

11.1 Further Research

There are irrefutably many further research topics regarding deposit insurance and many markets where interesting results regarding schemes could be found, e.g. emerging markets. One major further research area that this paper only slightly discusses is the pricing mechanism of deposit insurance. As interesting as it is to look at historical data and see whether deposit insurance seems to have been successful, it does not provide a solution for the future. The questions are not whether countries should have deposit insurance and if the EU should additionally take part in a cross-border deposit insurance scheme to ensure further diversification of risk and a common safety net. We should

instead ask how we can create deposit insurance schemes and an EDIS that gets rid of or at least mitigates the problems that it might initiate.

To deal with increased risk taking – moral hazard behavior – it can be argued that deposit insurance must have risk-adjusted premiums. It would further be interesting to see if different risk-taking behavior can be seen for banks that have equal based premiums, compared with banks in countries that have risk-based premiums. To study this, it would be required to have yearly data for when different countries have had risk-based vs. equal premiums.

SVENSK SAMMANFATTNING

Introduktion

Under det senaste decenniet har flera länder världen runt fått uppleva systematiska bankkriser som kan vara mycket kostsamma och utmanande att återhämta sig från. I Europa började skuldkrisen i maj 2010 och flera länder i euroområdet genomgick en djup och ihärdig finansiell kris vilket orsakades av både dåliga hanteringssytem för kriser och en skuldboom innan krisens början. Effektiva beslut har efter det implementerats i euroområdet med syftet att bygga ett bättre gemensamt skyddsnätverk. Till dessa beslut hör bl.a. lender-of-last-resort faciliteter vid centralbanken, insättningsgarantier, strategier för reglering och översikt av banker, och provisioner för att erhålla assistens från multinationella institutioner som IMF. (Baldwin & Giavazzi 2015)

Insättningsgarantier blev harmoniserade i Europeiska Unionen (EU) år 1994 och senare år 2010 utökades denna harmonisering till en gemensam insättningsgräns på 100.000€ per bankkonto per deponent. År 1974 hade endast 12 länder insättningsgarantier och år 2017 hade sammanlagt 139 länder implementerat en explicit sådan. (Demirgüç-Kunt & Detragiache 2000; Demirgüç-Kunt & Kane 2002; AIDI 2017).

Merton (1977) var den ledande upptäckaren av att när länder implementerar insättningsgarantier ökar bankernas risktagande, ett så att säga uppmuntrande för moraliskt risktagande (moral hazard). En möjlig förklaring till Mertons upptäckt kan vara att ifall banker fritt kan välja vilka projekt som skall finansieras, där alla projekt har samma nettonuvärde, kommer banker att välja projektet med den högsta risken. Bankerna gör detta eftersom försäkringspremien inte är beroende på mängden av risk som banker tar. En annan förklaring är att när en banks kunder vet att deras insättningar är garanterade har de inte så högt intresse att övervaka sin bank och upptäcka eller ens bekymra sig över en ökning i risktagandet.

Den senaste undersökningen gällande insättningsgarantier och moralisk risk på den europeiska marknaden har gjorts vid europeiska centralbanken (ECB), där Gropp och Vesala (2001) kom fram till att grundandet av insättningsgarantier signifikant sänker risktagande hos banker. Detta resultat strider mot vad forskare kommit fram till tidigare, där insättningsgarantier i de flesta studier har lett till ökat risktagande.

Under de senaste åren har även ECB diskuterat ett gränskorsande insättningsgarantisystem, som kallas för European Deposit Insurance Scheme (EDIS),

för att ytterligare uppmuntra till finansiell stabilitet och inte göra banker så beroende av sina nationer och därmed även skapa betydande diversifiering. Flera EU-länder motsätter sig detta förslag, bland dessa är bl.a. den finska regeringen och den tyska centralbanken (Bundesbank). (European Commission 2015a; Forsell 2017)

För att bättre kunna förstå karaktärer i risktagande hos banker i Europa och i relation till moralisk risk, kommer denna studie att se på insättningsgarantier och moralisk risk i Europeiska Unionen. De motstridiga resultaten från tidigare undersökningar och de aktuella diskussionerna vid ECB gällande ett gränskorsande insättningsgarantisystem utgör min motivation för denna avhandling.

Syftet med denna studie är att analysera ifall implementationen av explicita insättningsgarantier leder till ökat moraliskt risktagande hos banker i EU.

Insättningsgarantier

Insättningsgarantier utvecklades i USA av riksbanken efter den stora depressionen 1930–1931. Insättningsgarantier betyder att banker betalar ett premium till en insättningsgarantifond och får i utbyte en garanti på sina insättningar upp till en fastställd gräns ifall banken går i konkurs. System för insättningsgarantier har tagits i bruk i sammanlagt 139 länder och ytterligare 29 länder har sådana i utvecklingsfas (AIDI 2017).

Banker är de viktigaste finansiella intermedier i de flesta länder och eftersom de är högt skuldsatta och upprätthåller likvida tillgångar är deras portföljer mycket utsatta för likviditetsbrist och insolvens. Risken finns även att ifall en bank går insolvent kan det ha en överskottseffekt och skada de övriga bankerna i landet. Detta har lett till utvecklingen av insättningsgarantier. Insättningsgarantier kan även karaktäriseras av olika drag som privat eller publikt, fastställt eller riskjusterat premium, implicit eller explicit, och ex-post- eller ex-ante-fond. (Demirgüç-Kunt, Kane & Laeven 2008)

De största nackdelarna med insättningsgarantier är problem gällande moralisk risk och snedvridet urval (adverse selection). För att undvika dessa är prissättningen av garantisystemen avgörande.

Problemformulering

Merton (1977) var den första att upptäcka de negativa effekterna från insättningsgarantier när han visade hur dessa uppmuntrar banker att investera i riskabla

tillgångar. Denna effekt kan kallas för moraliskt risktagande och kan ofta uppstå i försäkringsindustrin när en person ökar sitt risktagande p.g.a. risken eller en del av den överförts bort genom försäkring. Insättningsgarantier uppmuntrar deponenter att välja sin bank utan att fundera över bankens företagsverksamhet. Detta frigör företagsledarna och aktieägarna att sträva efter högre vinst genom att investera i portföljer med högre risk än vad deras icke-garanterade deponenter vore villiga att acceptera. Denna ökning i risktagande är moralisk risk.

Det mest kända ursprunget för teorin om snedvridet urval kommer från Akerlof (1970) där han förklarar informationsasymmetrin mellan köpare och säljare i andrahandsmarknaden för bilar. Senare betonar Rothschild och Stiglitz (1976) i sin klassiska artikel de utmaningar som snedvridet urval framställer i försäkringsindustrin.

Snedvridet urval handlar om att det fanns två olika risktyper, bra och dålig, med olika sannolikheter för att undergå en förlust. Ifall dessa risktyper även vet sin egen risk typ, men försäkraren inte kan skilja på dessa och fastställer premiet genom att beräkna medeltalet för hela population för att undergå en förlust, då är det möjligt att det endast är de kunder av dålig risktyp som köper försäkringen. De av god risktyp kommer att köpa för lite av försäkringen eller ingen försäkring alls. Detta gör att försäkraren förlorar pengar och konstant måste höja premien för att täcka förlusterna som uppstår från den dåliga risktypen, vilket igen gör att ytterligare av den goda risktypen avstår från försäkring. Detta leder till en ineffektiv marknad som orsakats av informationsasymmetrier. (Rothschild & Stiglitz 1976)

Garcia (1998) förtydligar snedvridet urval i relation till insättningsgarantier ifall dessa vore på frivillig basis och premierna inte vore riskjusterade. Banker med lägre risk skulle inte vilja köpa försäkring och när de avstår från att delta i systemet skapar detta en pol med banker som har hög risk, vilket sedan höjer premierna. Till slut kommer endast banker med hög risk att kvarstå i garantisystemet tills systemet blir insolvent.

Tidigare studier

Insättningsgarantier har existerat i snart hundra år, vilket betyder att tidigare undersökning över effektiviteten av dessa system har utförts. Tidigare undersökningar visar att insättningsgarantier har lett till både ökad och minskad moraliskt risktagande runt om i världen.

Demirgüç-Kunt och Detragiache (2000) var den första som använde en gränskorsande databas för att undersöka länken mellan insättningsgarantier och finansiella kriser. Deras undersökning visar att popularitet för insättningsgarantier ökade under 80-talet och under 90-talet hade 40% av länder implementerat en explicit sådan. I undersökningen användes en dummyvariabel för när insättningsgarantier implementerats i ett land för att studera hur det påverkar bankers stabilitet. Resultaten visar att explicita insättningsgarantier tenderar att förstöra bankstabilitet och särskilt när räntorna är avreglerade och den institutionella omgivningen är svag.

Wheelock och Wilson (1994) genomförde en empirisk undersökning ifall implementeringen av insättningsgarantier leder till ökat risktagande. De argumenterade att insättningsgarantier under den tiden var den mest kritiserade statliga policyn när det gällde bank-, spar- och lånkonkurser. Forskarna använde en modell för att mäta bankkonkurser och inverkan av insättningsgarantier på sannolikheter av konkurser. Resultaten visade att insättningsgarantier kan öka sannolikheten för att en bank går under. Dessutom var garanterade banker mindre kapitaliserade och under vissa år mindre likvida än icke-garanterade banker. Kapitalisering och likviditet ansågs vara en viktig avgörande faktor för bankkonkurser.

Wheelock (1992b) kom även fram till att insättningsgarantier ökar en banks sannolikhet för att gå under. Alston, Grove och Wheelock (1994) konstaterade genom en studie som de gjorde på bankkonkurser för perioden 1921–1925 att insättningsgarantier var den enda andra viktiga faktorn förutom bankstorlek som påverkade konkurser.

I en nyligen gjord studie undersökte Liu, Zhang och Fang (2016) insättningsgarantiers effekt på bankers kreditrisk. De använde ett något annorlunda tillvägagångssätt när de tog i beaktan framåtsträvande och marknadsbaserade mätningar av bankkreditrisk, istället för att se på bakåtblickande relationstal från balansräkningen. Resultaten visade att länder med explicita insättningsgarantier har högre CDS-spridning. Detta skulle tyda på att insättningsgarantier ökar på risktagandet och att full täckning genom insättningsgarantier endast stabiliserar bankrisk under perioder av finansiell kris. De fann även att insättningsgarantier hade positiva effekter på volatila marknader. De betonade även att de oönskade effekterna från insättningsgarantier är mer närvarande i banker med låg kvalité på tillgångar och låg likviditet.

Kuisair, Sanusi och Ismail (2017) hävdade att ifall insättningsgarantier förbättrar finansiell stabilitet så påverkar den stabilitet mer generellt. De testade ifall

förtroendenivån av deponenter påverkas under tider av möjlig bankkonkurs i ASEAN-länder. De såg även på implementeringstidpunkten av insättningsgarantier och olika effekter från insättningsgarantier på bankers tillgångsstruktur. Resultaten visade att insättningsgarantier inte ökar deponenters förtroende men kan istället uppmuntra bankföreståndare att ta riskfulla investeringar för att kompensera för kostnader som uppstår i samband med insättningsgarantier.

Anginer, Demirgüç-Kunt och Zhu (2013) undersökte stabiliteten av finansiella marknader under krisperioder. Forskarna använde ett stort dataset av 4.109 börslistade banker i 96 länder under krisperioden 2007–2009. Undersökningsresultaten understödde teorin om moraliskt risktagande då den totala effekten av insättningsgarantier på bankrisk under hela perioden var negativ. Destabiliseringseffekten av garantin var mindre under krisperioden än vad den var innan krisens början. Däremot kan banköverväkning minska de oönskade effekterna från insättningsgarantier på systematisk risk under goda perioder.

Alla ovannämnda studier hänvisar till att insättningsgarantier har en negativ effekt på banker och marknaden vilket stöder teorin om ökat moraliskt risktagande. Det finns även studier som gett motstridiga resultat och dessa presenteras nedan.

Den viktigaste tidigare studien för denna studie är gjord av Gropp och Vesala (2001) vid Europeiska centralbanken. Deras analys används som stöd för denna studie. I deras studie analyserar relationen mellan insättningsgarantier, övervakning av skuldinnehavare, chartervärden för banker och risktagande i europeiska banker. Data samlades från sammanlagt 128 banker i Europa för perioden 1991–1998. Forskarna använde en tvärsnittsstudie och en tidsserieanalys för att undersöka existerandet av system för insättningsgarantier i Europa. Resultaten visade att explicita insättningsgarantier signifikant minskar risktagande av banker. Resultaten stöder hypotesen om att europeiska banksystem har karakteriserats av stark implicita garantier vid frånvarandet av insättningsgarantier. Dessa implicita garantier har fungerat genom allmänt ingripande under svåra tider. Forskarna testade även hypotesen om samspelet mellan insättningsgarantier och övervakning, chartervärden och too-big-to-fail (för mäktig för att gå under) -värden. Resultaten för denna hypotes visade att banker med lägre charter värden har lägre risktagande och detta mer efter introduktionen av explicita insättningsgarantier, vilket stöder antydandet att moraliskt risktagande är högre när banker presterar dåligt. Gropp och Vesala kom även fram till att skuldeinnehavare av

mindre prioritet övervakar banker effektivt. Slutligen visade studien att introduktionen av explicita insättningsgarantier inte dämpar too-big-to-fail-problem.

Karels och McClatchey (1999) kom även fram till att insättningsgarantier inte ökar risktagande i kreditföreningsindustrin. Effekten testades på kreditföreningar i Iowa (USA) efter implementeringen av insättningsgarantier, där de använde sig av två olika dataset, en tidsserieanalys för 1971–1990 och en tvärsnittsstudie för 1972–1978. Resultaten för båda analyserna var liknande. Tidsserieanalysen visade att kvaliteten av tillgångarna och likviditeten förbättrades efter implementeringen av insättningsgarantier. Tvärsnittsstudien visade, även efter justering av effekter från efterfråga och utbud, att garanterade kreditföreningar fungerade med mer kapital och generellt med bättre likviditet än sina icke-garanterade motparter.

De olika resultaten från tidigare studier påverkas onekligen av att studierna gjorts på olika geografiska områden och olika tidsintervall samt av att unika metoder använts. Dessvärre kan det konstateras att det förekommit perioder i USA där insättningsgarantier uppmuntrat till ökat risktagande och banker har utnyttjat detta. Med hänsyn till att insättningsgarantier tagits i bruk i USA redan för snart 100 år sedan, så kan det även konstateras att det skett förbättringar som tar hänsyn till ökat risktagande. Utvecklande ekonomier verkar även visa negativa effekter från insättningsgarantier och detta han delvis förklaras av en svag institutionell omgivning i landet.

Metod och data

Som metod används en tvärsnittsstudie där implementeringsåret för explicita insättningsgarantier undersöks tillsammans med andra karaktärer för insättningsgarantier, bankspecifika och landspecifika värden. För att undersöka effekten av insättningsgarantier signalerar noll i datasetet att ingen explicit insättningsgaranti funnits i landet och ett när en sådan funnits. En annan indikator som används är för när insättningsgarantin varit exceptionellt högt i landet. En tredje indikator används för när det andra direktivet för bankkoordination tagits i bruk i landet, eftersom detta signalerar en avreglering i bankindustrin.

En banks charter värden är lika med marknadsvärdet av dess tillgångar. Tobins q (q) används som mått för charter värden och det anger kostnaderna för att uppbygga en bank från grunden (Furlong & Kwan 2006). Keeley (1990), Demsetz, Saidenberg och

Detragiache (1996), och Gropp och Vesala (2001) använde även Tobins q för att mäta chartervärden och dess fördel är att det tillåter jämförelse mellan olika bankstorlekar. Det mäter också monopolisk hyra som banker kan förtjäna tack vara prissättningsmakt. Tobins q beräknas som marknadsvärdet på summan av eget kapital och skulder, delat med tillgångar.

Relationstal från balansräkningen används för att kontrollera för bankspecifika skillnader. Dessa är insättningar i totala skulder, andelen icke-räntebärande inkomst i totala reserver, och andelen kundlån i totala tillgångar. Tillväxten av tillgångar används som en kontrollvariabel.

Landspecifika värden som används i analysen som oberoende variabler är 10-åriga statsobligationer minus räntan på penningmarknaden, räntan på penningmarknaden, och tillväxten på indexet för aktiemarknaden. De matematiska formlerna för de olika relationstalen kan ses i bilaga 2.

I regressionsanalysen används en tvåstegsmodell där avreglering och charter värden beräknas i det första steget. Det förutsagda värdet på q används sedan som en oberoende variabel i det andra steget som mäter risktagande. I det andra steget görs tre olika regressioner med skuldsättningsrisk, tillgångsrisk och totalrisk som beroende variabler. Skuldsättningsrisk beräknas som bokföringsvärdet av skulder delat med marknadsvärdet av tillgångar. Tillgångsrisk beräknas som andelen problemlån i totala tillgångar. Totalrisk beräknas som intradagsvolatilitet av aktiepriser.

I studien analyseras två olika hypoteser. Den generella hypotesen presenteras på följande sätt:

H1: Introduktionen av insättningsgarantier ökar skuldsättnings-, tillgångs- och totalrisken i banker

Nollhypotesen anger att insättningsgarantier inte signifikant leder till en ökning i risktagande hos banker. Alternativhypotesen anger det motsatta, att detta leder till en ökning i risktagande.

Ytterligare en hypotes testas och den undersöker om vissa variabler och karaktärer påverkar chartervärden och olika typer av risk. För både modell 1 och 2 undersöks den följande hypotesen:

H2: Introduktionen av insättningsgarantier ökar skuldsättnings-, tillångs- och totalrisken i banker med låga charter värden mer än risken i banken med höga charter värden

Datamaterialet har samlats in från Datastream och hypoteserna testas i E-Views. Data har samlats för sammanlagt 67 banker i EU för tidsperioden 1992–2016. I analysen används en GLS modell med antingen ”slumpmässiga effekter” eller ”fasta effekter” (inom ekonometrin går benämningen enligt ”random effects” och ”fixed effects”), beroende på vilken som är mer lämplig för datasetet.

Resultat

Resultaten från det första steget av modellen (1) fungerar som en förutsägelse för värdet av *q* och tacklar endogena problem mellan *q* och måtten för risk. Implementeringen av avregleringen i EU under 1990-talet anses inte ha en signifikant effekt på charter värden (*q*). Gropp och Vesala (2001) kom fram till liknande resultat och sammanfattade genom att anföra att avregleringen endast gradvis påverkar *q* och inte genast under året då det implementerats. Variablerna för insättningsgarantier är båda signifikanta. Implementeringen av insättningsgarantier har en positiv relation till charter värden. När ett land tagit i bruk insättningsgarantier ökar chartervärden för bankerna. När täckningen för insättningsgarantierna går upp i ett land eller när ett land har hög täckning på insättningsgarantier, går även bankers chartervärden upp i landet.

Även de flesta koefficienterna för relationstal från balansräkningen är signifikanta. Banker med en lägre andel insättningar har högre chartervärden och banker som är mer innovativa (hög icke-räntebärande inkomst) har även högre chartervärden. Andelen icke-räntebärande inkomst kan även betyda att banker med en mer diversifierad affärsmodell är högt värderade på marknaden. Tillväxten av tillgångar visar att när tillväxten är högre under ett år, tenderar även chartervärden att vara högre, vilket antyder att banker med högre tillväxt har högre charter värden.

Värden för avkastningen på penningmarknaden visar att när penningmarknadsfonden i ett land presterar bra ökar charter värden för bankerna i landet. Resultaten visar även att när avkastningskurvan är brantare visar sig även chartervärden vara högre.

Det andra steget av modellen (2) mäter relationen mellan risk och insättningsgarantier, vilket är det primära målet i denna studie. Med modellen mäts tre olika risktyper: skuldsättningsrisk, tillgångsrisk och totalrisk.

Resultaten för de olika typerna av risk varierar aningen. Implementeringen av insättningsgarantier i ett land anses inte ha någon signifikant effekt på risktagande av banker. Dessvärre, när täckningen för insättningsgarantier i ett land är högre är även skuldsättnings- och tillgångsrisken högre, men totalrisken är lägre. Det är värt att anmärka att de flesta länder hade en ökning i täckningen för insättningsgarantier från år 2008, vilket var mitt under den finansiella krisen. Detta kunde även ha påverkat ökningen på de olika måtten för risk.

Implementeringen av EC-direktivet, vilket åstadkom avreglering i bankmiljön i EU, ser ut att ha ökat tillgångsrisken. Detta kunde förklaras genom att avregleringen gett mer frihet åt banker att anta mer risk vilket följaktligen ökat på andelen problemlån. Avregleringen resulterade även i en intensivare konkurrens mellan banker i EU vilket även kunde ha resulterat i att banker gett ut lån mer vårdslöst.

Beroende variabeln för tillgångsrisk är andelen problemlån i totala tillgångar. Problemlån är ständigt i fokus i diskussioner gällande bankers balansräkningar i EU. Enligt Magnus, Deslandes och Dias (2018) vid Europiska parlamentet är problemlån den huvudsakliga orsaken bakom den låga lönsamheten i europeiska banker. Problemlån har ökat signifikant från hanterbara nivåer innan krisen och stor press har lagts på banker i EU att minska andelen problemlån från balansräkningarna.

För tillgångsrisk kan man se att banker med en högre andel insättningar tenderar att ha högre risk. Resultaten antyder även att när en bank fokuserar mer på verksamhet som inte tillhör utlåningsverksamheten sjunker tillgångsrisken.

Resultaten anger även att när tillväxten på tillgångarna för en bank är högre, minskar tillgångsrisken. Detta kan förklaras genom att när totala tillgångar, vilket fungerar som nämnaren för tillgångsrisk, ökar, så minskar andelen problemlån i totala tillgångar, om man förmodar att det inte skett någon ökning eller en mindre ökning av problemlån.

Med resultaten från studien förkastas den första hypotesen om att insättningsgarantier ökar skuldsättnings-, tillgångs- och totalrisken i banker, eftersom koefficienterna för variabeln inte är signifikanta. Den andra hypotesen som förslagits förkastas även, eftersom charter värden signifikant ökar skuldsättnings- och totalrisken men minskar tillgångsrisken. Relationerna mellan de olika risktyperna och charter värden är inte konsistenta och förkastas därmed.

Konklusion

Med pågående diskussioner gällande EDIS och motstridiga resultat från tidigare studier gällande insättningsgarantier och moralisk risk, hade denna studie som målsättning att se ifall explicita insättningsgarantier har ökat på risktagandet av banker i EU. Panel data samlades för sammanlagt 67 banker i EU från 1992 till 2016.

Resultaten från två-stegs regressionerna (1 och 2) visar att explicita insättningsgarantier inte signifikant ökar på risktagandet av banker och leder därmed inte till moraliskt risktagande. Resultaten överensstämmer med undersökningsresultaten i Gropp och Vesalas (2001) studie, vilken också gjordes på den europeiska marknaden. Resultaten kan antyda att utformningen av explicita insättningsgarantier i EU är väl gjorda och att explicita insättningsgarantier inte leder till moraliskt risktagande, men implicita leder, vilket kunde förklara de olika resultaten från tidigare studier och även förklara varför risktagandet minskat när ett explicit system introducerats.

Trots resultaten i denna studie är det viktigt att genomförligt diskutera EDIS påverkan på sina medlemsstater. Den europeiska kommissionen har gjort ett förslag att integrera EDIS tills år 2024 följande en trestegsprocess. Schnabel och Véron (2018) och Schoenmaker (2018) diskuterar vikten med avlägsnandet av problemlån och prissättningen av insättningsgarantier. Forskarna föreslår även att landspecifika och olika värderingssystem borde introduceras till prissättningen av EDIS för att minska moraliskt risktagande.

Det finns ovedersägligen flera forskningsområden när det gäller insättningsgarantier och flera marknader där intressanta resultat kunde hittas, som t.ex. växande marknader. Ett stort forskningsområde som denna studie endast aningen diskuterat är prissättningen av insättningsgarantier. Även om det är intressant att blicka bakåt och se om insättningsgarantier varit lönsamma så förser det inte med lösningar för framtiden. Frågan är inte ifall vi borde ha insättningsgarantier och om vi dessutom borde delta i ett gränsomfattande insättningsgarantisystem för att öka diversifiering av risk. Vi borde istället fråga hur man kan skapa ett insättningsgarantisystem och en EDIS som avlägsnar eller åtminstone dämpar problemen som den initierar.

För att behandla ökat risktagande – moraliskt riskbeteende – kan det påstås att insättningsgarantier borde ha risk-justerade premier. Det vore ytterligare intressant att undersöka ifall det finns skillnader i bankers riskbeteende i länder där man har risk-

justerade premier jämfört med länder där man har fasta premier. För detta borde man dock ha årlig data för när olika länder haft risk-justerade eller fasta premier.

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APPENDIX 1 CHARACTERISTICS OF DEPOSIT INSURANCE SCHEMES IN THE EU

Country	Date established	Coverage 1998 (end) €	Coverage 2010 (end) €	Risk based premiums	Equal premiums
Austria	1979	20 000	100 000		x
Belgium	1974	15 000	100 000		x
Denmark	1987	40 045	50 000	x	
Finland	1999	25 000	100 000	x	
France	1980	60 000	100 000	x	
Germany	1966	20 000	100 000		x
Greece	1995	20 000	100 000	x	
Ireland	1989	15 000	100 000		x
Italy	1987	103 291	100 000	x	
Netherlands	1979	20 000	100 000	x	
Poland	1995		100 000		x
Portugal	1995	25 000	100 000	x	
Spain	1977	20 000	100 000		x
Sweden	1996	29 000	50 000	x	
UK	1982	22 200	100 000		x

APPENDIX 2 DEFINITIONS OF VARIABLES

Symbols: j = banks, t = periods, i = countries

EC Directive Implemented

1 if
i = DE, GR, FR, IE, IT, NL, PT, SE, UK and $t \geq 1993$
i = AT, BE, FI and $t \geq 1994$
i = ES and $t \geq 1995$
i = DK and $t \geq 1996$

= 0 otherwise

Implementation of explicit deposit insurance

1 if
i = AT, BE, DK, FR, DE, IE, IT, NL
i = GR, PT, SE and $t \geq 1996$
i = PL, PT and $t \geq 1995$
i = FI and $t \geq 1999$

= 0 otherwise

Deposit insurance coverage high

1 if
i = FR, IT
i = AT, BE, DK, DE, GR, IE, FI, NL, PL, PT, ES, SE, UK and $t \geq 2008$

= 0 otherwise

Demand deposit share

= Demand deposits$_{jt}$ / total assets$_{jt}$

Loan share

= Customer loans$_{jt}$ / total assets$_{jt}$

Share of non-interest income

= Non-interest income$_{jt}$ / total reserves$_{jt}$

Growth rate of assets

= {[Assets$_{jt}$ – assets$_{jt-1}$]/ assets$_{jt-1}$}

Growth of stock market

= {[Stock market index$_{jt}$ – stock market index$_{jt-1}$]/ stock market index$_{jt-1}$}

Government bond yield – money market rate

= 10-year government bond yield$_{it}$ – money market rate$_{it}$

Money market rate

= month money market rate$_{it}$

APPENDIX 3 RESULTS FOR TEST OF APPROPRIATE MODEL

Stage 1 - Model 1 (q)

	Cross-section	Time
Breusch-Pagan	1768,109	1,91
Probability	(0,000)***	(0,1672)
Hausman	22,81	
Probability	(0,0115)**	

A cross-section random effects (EGLS) model was used

Stage 2 - Model 2 (leverage risk)

	Cross-section	Time
Breusch-Pagan	11,28	1,61
Probability	(0,0008)***	(0,2039)
Hausman	37,05	
Probability	(0,0001)***	

A cross-section random effects (EGLS) model was used

Stage 2 - Model 2 (asset risk)

	Cross-section	Time
Breusch-Pagan	1,39	170,24
Probability	(0,2032)	(0,0000)***
Hausman	170,85	
Probability	(0,0000)***	

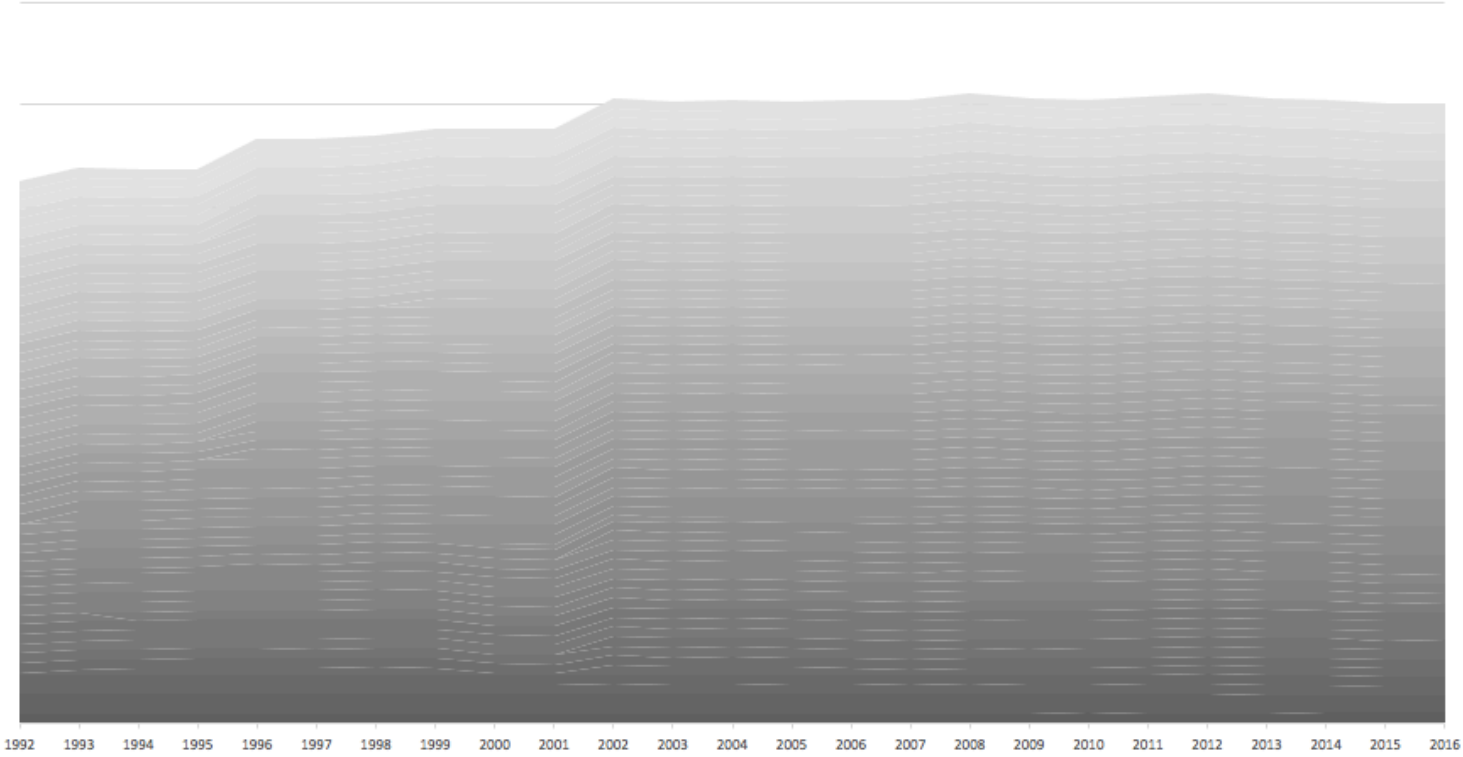
A time specific random effects (EGLS) model was used

Stage 2 - Model 2 (overall risk)

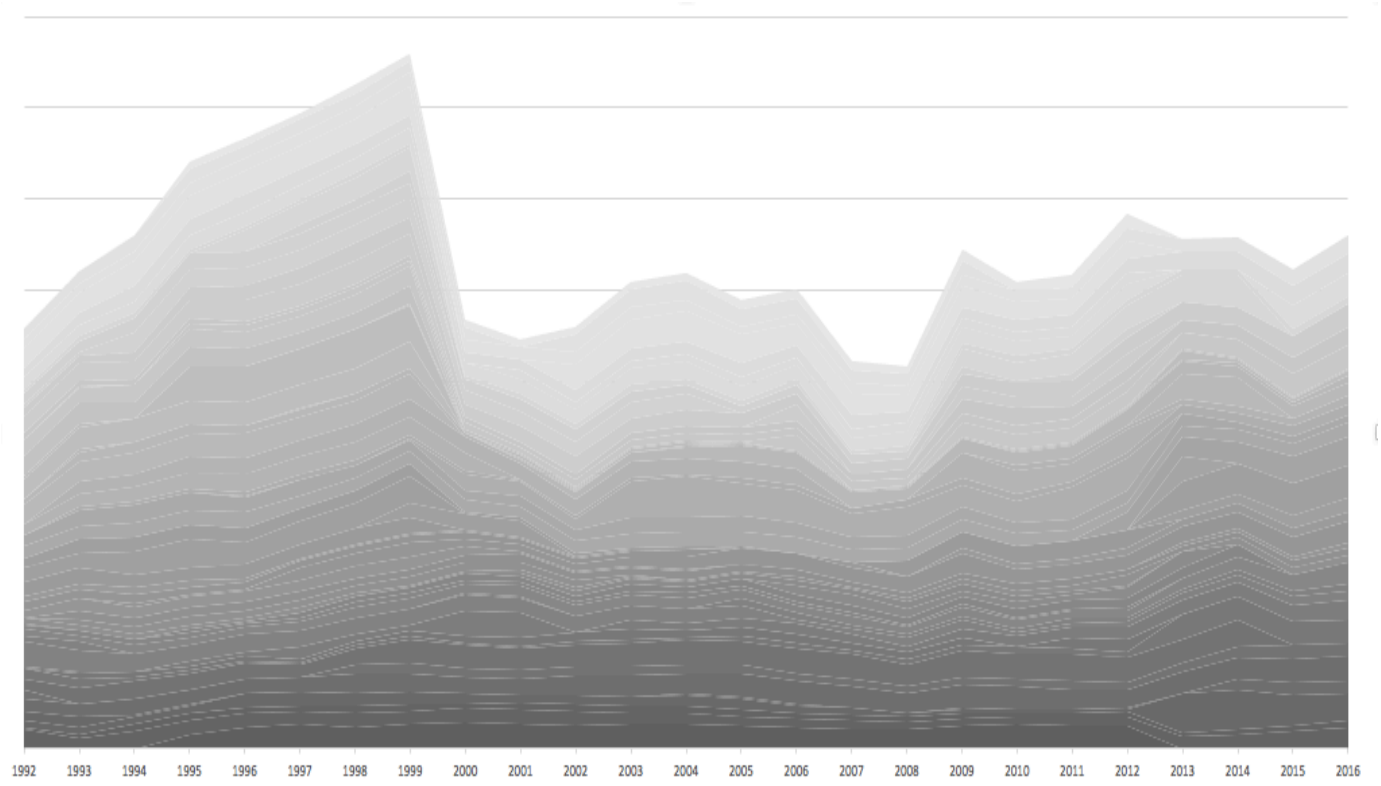
	Cross-section	Time
Breusch-Pagan	2,31	87,73
Probability	(0,1284)	(0,0000)***
Hausman	63,83	
Probability	(0,0000)***	

A time specific random effects (EGLS) model was used

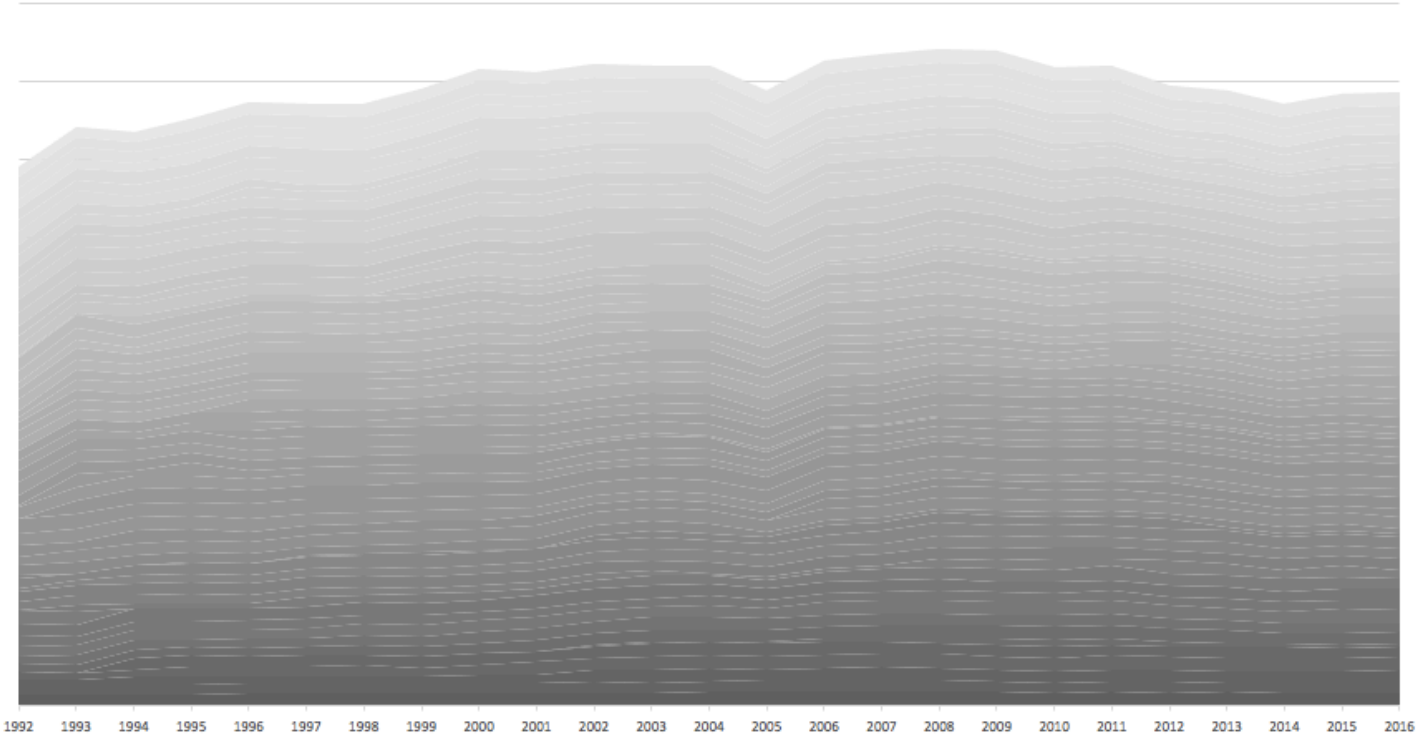
APPENDIX 4 DEVELOPMENT OF Q, 1992–2016



APPENDIX 5 DEVELOPMENT OF DEMAND DEPOSIT-TO-TOTAL ASSETS, 1992–2016



APPENDIX 6 DEVELOPMENT OF LOANS-TO-TOTAL ASSETS, 1992–2016



APPENDIX 7 DEVELOPMENT OF NON-INTEREST INCOME-TO-TOTAL RESERVES, 1992–2016