



Thesis Proposal

EMPIRICAL STUDIES IN BANKING

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1 Introduction

What is the future of bank regulations and what are the consequences for banks and society? To answer this question, we need a thorough understanding of the effects and consequences of bank regulations, including not only the effect on banks but also the effect on the customers of the bank.

The purpose of banks are numerous, however, their most important task is to manage savings and to channel this capital into society by lending out to households and companies. Therefore, banks are an essential part of the society for continuous growth and development.

Regulations of banks are considered necessary to maintain financial stability. Fundamentally, banks are fragile because the maturities of the savings not necessarily match the maturities on the loans. In case of financial instability, depositors might want to withdraw their savings (if they are in fear of bank failure) and if they all run to the bank simultaneously, the bank will not have enough liquid assets to meet the demand. The concern of regulators is not a separate run on *one* bank, but if this spreads to the whole banking industry, causing a domino-like collapse of banks, there will be serious consequences.

Another very relevant concern is the asset price spiral. Banks who rely much on inter-bank lending and capital market funding (such as commercial papers) rather than retail deposits, might become subject to solvency problems. For example, if bank A reduces the amount of lending to bank B, then B will also have to reduce its lending to bank C which might develop into a spiral effect similar to a bank panic. This means that the actions of one bank in anticipation of some certain behaviour of other banks consequently can dry-out the liquidity in the inter-bank market, as we saw in the latest financial crisis (Schooner and Taylor, 2010).

The uncertainty and the potential serious outcome of bank instability, are reasons to why governments choose to provide financial safety nets. The financial safety net consists of a lender of last resort¹, a deposit insurance scheme and government bailout. The problem of the financial safety net is that it can give rise to excessive risk takings of banks, hence moral hazard problems can emerge. To mitigate this, governments around the world have introduced regulations as a way to limit risk-taking incentives of banks.

The challenge of bank regulation is to identify the pros and cons; which regulations are necessary, and more importantly, what are the consequences of these. When understanding the impact of current regulations, it becomes possible to discuss the future of regulations. Regulations of banks do not only influence the banking industry but especially also the small- and medium sized firms, who have limited possibilities of raising capital, and therefore

¹The Central Bank has function as LLR meaning that in time of turbulence it continues lending when nobody else wants to

are very dependent on bank loans. An additional and interesting aspect of analysis is therefore the link between bank and customer. By taking advantage of the unique Danish data on bank-customer relations (i.e. corporate customers), several aspects of this relation can be analysed.

During my PhD, I will test the effect of bank regulations with regards to the corporate customers of the banks. The interesting aspect is especially the creation of credit crunches. How effective is the financial safety net when we still experience bank crises, freezing of the inter-bank market and a reluctance of banks to provide loans to companies and households. Overall, my thesis will contain interesting new aspects into the debate on regulatory consequences and the potential credit crunch outcomes.

The report is organized as follows. Section 2 contains the working paper of my first article which is a joint work with my supervisor Jan Bartholdy. Section 3, 4 and 5 are descriptions of the preliminary ideas for future research to be contained in the PhD thesis within the overall subject of *Empirical Studies in Banking*. The appendix describes my current progress of the formal requirements of the PhD programme.

2 Deposit Insurance and Moral Hazard Does Ownership Structure Matter?

ABSTRACT This study provides empirical evidence on the moral hazard implications and monitoring effects of introducing explicit deposit insurance. Denmark offers a unique setting because commercial banks and savings banks (in Danish: sparekasser) have different ownership structure, but are under the same set of regulations. This makes a comparison of the two types of banks possible, while focusing on the ownership structure and the monitoring effect. The testing of moral hazard is twofold. Firstly, we test the behaviour and risk-takings of commercial banks versus savings banks around the introduction of deposit insurance in Denmark in 1988. Secondly, we test if deposit insurance causes changes in leverage for Danish firms.

Deposit insurance *per se* does not mitigate higher risk takings, however, the analyses show that commercial banks *do* behave more risky after deposit insurance is implemented. Additionally, the debt-equity ratios of firms increase significantly for customers of commercial banks after deposit insurance is introduced. These results indicated, that the ownership structure of banks *does* influence the risk taking, and that deposit insurance cause moral hazard problems when the bank has opportunity and incentive to increase risk.

2.1 Introduction

One lesson to be learned from the latest financial crisis is the importance of financial stability and confidence to the system. Deposit insurance, as part of a sound financial safety net, plays an important role by preventing bank runs in times of uncertainty, hence increasing financial stability. A bank run occurs if all depositors simultaneously runs to the bank to withdraw their savings, because there will not be enough liquid assets to meet the demand (Diamond and Dybvig, 1983). A serious problem arises if a run to *one* bank spreads to more banks, causing financial contagion. On the other hand, the positive effect of bank runs is that they clean out in the bad banks.

Bank runs are not the only concern regarding deposit insurance and banking instability. Increased risk takings of the bank might result in insolvency problems and credit crunches and consequently leading to instability of the financial system (Ngalawa et al., 2011).

A serious concern when introducing deposit insurance is the creation of perverse incentives, which might influence the behaviour of the bank. There are several reasons to why the bank will have incentive to invest in high-risk, high-return projects after the introduction of deposit insurance.

Firstly, the insurance premium does not fully reflect the risk of the banks' assets. In some countries, like Denmark, the premium is flat-rate and there-

fore proportionate with the volume of deposits and completely independent of the riskiness of the assets². Other countries have chosen a risk-based system which most often is determined on the basis of capital adequacy, CAMEL(S) ratings³ and supervisory ratings. A problem of the risk-based system is that risk cannot be measured *ex ante* but only based on historical data. Despite the complexity of a risk-based system, an increasing number of countries have chosen to implement it: by 2000, 40 percent of the countries with explicit deposit insurance had adopted such a system (Demirgüç-Kunt et al., 2008b, Chap.3.3.1). No countries have, however, chosen to base risk premiums on option pricing or other market-based pricing. The problem of pricing deposit insurance is that high-risk banks have no incentive to reveal their true risk, hence pay a higher risk premium for the deposit insurance (Chan et al., 1992). Freixas and Rochet (1998) find it possible to price deposit insurance fairly, however, this is not desirable because the low-risk banks will get an inefficient restriction on their deposits. They conclude that the constraints should be relaxed, so the low-risk bank pay a bit too much and the high-risk bank a bit too little for their insurance. These findings are theoretical, but in reality there are great variations between countries in the pricing of deposit insurance.

Secondly, the bank management and owners have incentive to increase risk because of limited liability. The deposit insurance can be seen as a put option on the assets of the bank⁴, written by the deposit insurance fund. In case of bank failure, the fund is responsible for paying back the depositors if the value of the bank is lower than insured deposits. The value of an option increases with the volatility of the underlying asset, so increasing the risk of the bank maximises the value of the option. This will therefore *add* to the owners' incentive to invest in high-risk, high-return projects.

Thirdly, once the depositors are guaranteed their savings in case of bank failure, they have no incentive to monitor the risk-takings of the bank. If the depositors were not guaranteed, they would require a higher interest rate on their deposits, to compensate them for the riskiness of the bank. Deposits are usually guaranteed up to a predetermined limit. At the introduction of deposit insurance in Denmark, the limit was DKK 250,000. In 1995, this was raised to DKK 300,000. Caused by the recent financial crisis, the government introduced unlimited protection in 2008, and then from January 2010, the limit was DKK 750,000.

This study adds to literature by testing the relation between ownership structure and moral hazard. To our knowledge, no prior study has been

²The risk premium in Denmark is 0.2 percent of insured deposits (Demirgüç-Kunt et al., 2008b, Table 3.6)

³This is short for Capital adequacy, Asset quality, Management, Earnings, Liquidity (and Sensitivity to market risk)

⁴The first to apply option pricing on deposit insurance was Merton (1977)

able to analyse ownership structure in private banks and the monitoring effect around introduction of deposit insurance. Denmark is a good example because there are two samples to compare, savings banks and commercial banks. These are under the same legal regulations, but the difference in ownership structure makes a comparison interesting.

The strength of the paper is that it does not only contain a before-and-after analysis, but more importantly, it compares two samples during the whole period. There might be other external factors to affect the behaviour before and after introducing deposit insurance, but by having a difference-in-difference analysis, we assure the two groups to be influenced simultaneously.

The rest of the paper is organised as follows. Section 2.2 describes the history of the Danish savings banks and the difference in ownership structure between savings banks and commercial banks. Related literature and research questions are presented in Section 2.3. The description of measures and variables, data and the techniques used for analyses are all contained in Section 2.4, and preliminary results are presented in Section 2.5. The paper concludes the preliminary findings in Section 2.6.

2.2 The Danish banking industry

The first savings bank in Denmark (Den Holsteinborgske Sparekasse) was founded in 1810, and the first commercial bank (Fyens Disconto Kasse) is from 1846. The savings banks have been regulated by law since 1880, whereas the first act for commercial banks goes back to 1919. Historically, there are fundamental differences between the two types of banks; savings banks being social responsible, whereas commercial banks were perceived as capitalists (Hansen, 2007).

2.2.1 The formation of Danish savings banks

As the savings banks evolved they grew a special relation to workers and small firms, and since 1880 their relation to the agricultural customers developed rapidly. The main purpose of the savings banks was to store savings and to encourage people to be thrifty. They presented themselves as mutual, self-governing, democratic and non-profit oriented, and came to symbolise the very opposite of commercial banks. In general, the savings banks had a much better reputation than commercial banks. Industrialization did, however, change society, and despite resistance in the savings banks community, they were forced to adapt according to circumstances in order to survive.

The period between the 1960s and 1990 was a turbulent time for the Danish savings banks community. The savings banks had always been restricted in their business, which also gave them the advantage of not paying taxes and having lower capital requirements. However, they were losing cus-

tomers to commercial banks, because they could not offer the same kind of services. The savings banks could for example not make stock and currency transactions, and they had no license to grant blank credits and cash credits to customers (Hansen, 2007). The need for changes in regulations became more and more evident, however, this would not happen without great opposition.

The Act of 1974 came into effect in 1975, where Danish savings banks came under the same set of regulations as the commercial banks. Legally, there were from then on no differences between the two types of banks, other than ownership structure. Savings banks could now offer the same kind of services, but commercial banks could more easily raise equity because of their joint-stock ownership. Some savings banks were therefore still not satisfied, because they felt financially constrained in their business. In late 1988, The Banking Act made it possible for savings banks to convert into joint-stock ownership, and the legal framework was now completely alike (Hansen, 2007).

2.2.2 Ownership structure

Commercial banks have joint-stock ownership, hence they are under The Companies Act. Besides the daily management, banks must also have a board consisting of at least five members, where additional two board members can be elected by the staff in banks with more than 50 employees⁵. The highest authority of a bank is the annual general meeting, which must be publicly announced.

Savings banks are required to have a management, a board, and a committee of representatives. The committee of representatives resembles the annual general meeting of banks. It must consist of at least 21 members who are elected by either depositors, depositors together with guarantors, or by guarantors alone. One depositor has one vote, whereas a guarantor has one vote for every DKK 1,000 paid as guaranteed capital, however, with a maximum of 20 votes (Jensen and Noergaard, 1976).

Voting ceilings are in the nature of savings banks, but even before 1980, some commercial banks have also had voting ceilings although they operate under The Companies Act. Banking is the only industry with voting ceilings for joint-stock companies.

The role of monitoring in banks has been addressed by Bechmann and Raaballe (2010), who find a dispersed ownership to have negative consequences on corporate governance. They test the risk-taking and performance

⁵With the Act of June 10th 1987, this limit was changed to 35 employees (Jacobsen, 1996, p.18)

of Danish listed banks between 1995 and 2009, and conclude that bad corporate governance was the main source to financial problems. In 2009 less than 20 percent of the listed banks had one large shareholder (>5 percent ownership), whereas the number is as high as 90 percent for "normal" listed firms on Copenhagen Stock Exchange⁶. Banks without a large shareholder have no effective monitoring and consequently the CEO can become too powerful.

2.3 Related literature

The interesting question is whether or not explicit deposit insurance cause failure in market discipline by inducing moral hazard, and this has drawn much attention from regulators as well as researchers. The main motivation for implementing explicit deposit insurance - to increase financial stability⁷ - requires the scheme to be properly designed.

There are situations where the bank does not have incentive to take excessive risk. The extreme is a situation of monopoly, because the bank then can extract rents (charter value). In perfect competition, the market forces will adjust prices, hence there are no rents, and therefore the bank has incentive to increase risk for a high upside potential. Specific deposit design features can also mitigate moral hazard. For examples by excluding certain types of deposits from insurance (e.g. foreign currency deposits and inter-bank deposits), "coinsure" a proportion of the balance, or by charging risk-adjusted premiums (Demirgüç-Kunt et al., 2008b, Chap.1).

Today, regulators promote deposit insurance and there are several reports available on how to develop and implement effective deposit insurance systems⁸. The Basel Committee was, however, reluctant to recommend and publish an implementation guide because of the necessity of tailoring the system to the specific country (Bank of International Settlements, 1998). Demirgüç-Kunt and Kane (2002) and Demirgüç-Kunt and Detragiache (2002) are among the first to make empirical cross-country studies because of their access to unique data from The World Bank. They have detailed data on characteristics of deposit insurance systems, and they analyse the effect of deposit insurance across countries. One of the main findings is that a sound financial and regulatory environment is essential for gaining advantage of deposit insurance (Demirgüç-Kunt et al., 2008b,c). Demirgüç-Kunt and Detragiache (2002) find an increased likelihood of banking crises when introducing explicit deposit insurance, and this effect is stronger if bank interest rates are deregulated and there is a weak institutional environment in the

⁶38 percent of the listed banks strengthened their voting ceilings in the period between 1978-86, whereas only 5 percent removed it (Bechmann and Raaballe, 2010, p.20)

⁷Protecting unsophisticated depositors and increase the ability of small, opaque banks to compete with large banks are other arguments favouring deposit insurance.

⁸E.g. Financial Stability Forum (2001) and Bank for International Settlements (2009)

country.

Kam (2011) argues that by promoting deposit insurance, regulators are actually working against Pillar 3 of Basel II, i.e. the market discipline. The regulators do not value the positive side of bank runs, namely the mechanism for cleaning out in bad banks. Kam (2011) finds that countries with a high deposit insurance coverage also experience the most banking crises as a result of failing market discipline.

Ngalawa et al. (2011) similarly find an increased likelihood of bank insolvency when deposit insurance is fully guaranteed. Additionally, deposit insurance does not induce moral hazard *per se*, but when deposit insurance is combined with an increase in credit to the private sector, the link with bank insolvency becomes positively significant (Ngalawa et al., 2011). Also Carapella and Giorgio (2004) find an increase in bank lending (lending to deposits) by introduction of explicit deposit insurance, however, countries with high institutional quality exhibit lower lending-deposit spreads.

Empirical evidence shows how the market participants value the introduction of deposit insurance and the possible moral hazard concerns, i.e whether deposit insurance is good or bad news. One study, which tests the market reaction to the announcement of introducing explicit deposit insurance in Denmark, is by Bartholdy et al. (2004). They find a positive effect in the value of listed banks (stock prices) around the announcement date, with large banks reacting the most. Large banks benefit at the expense of small banks because of two mechanisms; firstly, they are no longer expected to buy small banks in distress since these will be allowed to fail⁹. Secondly, if a large bank fails, the fund has to pay out the depositors which will cause the deposit insurance premium to increase significantly for *all* banks. An increase in the insurance premium will especially influence small banks, hence large banks are *too big to fail*. Surprisingly, Bartholdy et al. (2004) find a negative change in stock price of small, high risk banks. This might be explained by a higher down-side risk for shareholders since they cannot expect the bank to be bailed out in case of financial distress, leaving bankruptcy more likely.

The banking system in Denmark in the late 80s attracted attention from several researchers¹⁰. Denmark was a special case because of mark to market accounting and the strict regulations ensuring a high capital buffer. Although the use of mark to market accounting gives greater volatility in the reported profit, Bernard et al. (1995) supported an implementation of mark to market accounting for financial institutions in USA by following the Danish example.

⁹Historically, only few failures have happened in the banking industry in Denmark because weak banks have been absorbed by the strong banks (Pozdena, 1992)

¹⁰see e.g. Pozdena (1992) and Bernard et al. (1995)

2.3.1 Development of research questions

The role of monitoring and market discipline is highly important in the banking industry as a way to avoid or limit moral hazard and opportunistic behaviour. Banking is, in general, very complex and opaque, which makes prudential regulation and supervision even more important. However, monitoring is expensive which is also why *free-rider* problems are likely to occur.

The difference in ownership structure between savings banks and commercial banks implies a difference in the level of monitoring. Market discipline is exercised by shareholders, large creditors as well as depositors, but it also depends on institutional factors, including ownership structure. Studies analysing the relation between ownership structure and deposit insurance have focus on government owned banks¹¹ (see e.g. Demirgüç-Kunt et al. (2008c), Angkinand and Wihlborg (2010) and Demirgüç-Kunt et al. (2008b, Chap. 8).

As described in the seminal paper by Jensen and Meckling (1976), a separation of ownership and control results in *agency costs* because the principal and the agent have different objectives, hence different incentives. Savings banks are independent and the equity capital is paid by guarantors, who will get a fixed premium on their guaranteed capital. In this way, they have no incentive to induce risky behaviour for a potentially higher profit¹².

Some theory and prior literature brings support for not finding a difference in the risk-takings of commercial and savings banks. This can either be caused by no significant change in behaviour compared with previous years, or that both types of banks exhibit an equal change in behaviour. As argued by regulators (IMF, The World Bank, ECB, The Basel Committee etc.), moral hazard issues will only be present in a situation where the insurance system is not properly adjusted to the particular country. The country will only benefit from deposit insurance if the system is well designed and the country already has prudential regulation and supervision, a sound economic environment, a healthy banking system and a well-developed legal framework (Bank for International Settlements, 2009). These features provide a fairly good description of the characteristics of the Danish system.

Additionally, an argument towards not finding a difference in reaction is that Denmark already had implicit deposit insurance, where depositors believed the government would intervene in case of bank failure. In contrast to most research, Gropp and Vesala (2001) find deposit insurance to *reduce* the risk-taking of European banks because of the strong implicit deposit

¹¹When not government owned, they are either privately or foreign owned. All the Danish banks are privately owned.

¹²As previously described, the guarantors exert their influence through the committee of representatives, which is the highest authority of the savings bank.

insurance. The implicit deposit insurance implies that the public, i.e. the government would intervene in case of financial distress, so by introducing an explicit insurance, the scope of the financial safety net is reduced. Therefore, implicit deposit insurance might be just as effective as explicit deposit insurance in a country like Denmark. Through legislation, Denmark has strong creditor rights, which according to Bartholdy et al. (2003) might be a substitute for deposit insurance, in which case deposit insurance has no effect. Capital requirements can also be a substitute for deposit insurance, and at time of introduction the capital to asset ratio was 15 percent, a high ratio compared with other European countries. This is also a reason for the capital requirements of Basel I to have very limited effect on Danish banks (Pozdena, 1992). Also Demirgüç-Kunt et al. (2008c) find banks to adopt better risk controls when the country has stringent capital requirements beforehand.

Finding a difference in behaviour between the two types of Danish banks brings support to a relation between moral hazard and ownership structure. Commercial banks have a lot of monitors (stock holders), however, there will also be many free-riders. Savings banks do on the contrary only have few monitors (the committee of representatives), which probably will result in a more prudent attitude towards risk-takings. According to this, it would be expected to see commercial banks taking higher risks than savings banks.

As another argument in favour of finding a difference in behaviour, savings banks are non-profit organisations, as opposed to the banks who strive to maximize profits. A way to mitigate a morally hazardous behaviour is by creating appropriate incentives for bank management through good corporate governance and sound risk management. This can be exercised through regulations and law, but because the banking industry is very opaque, it is a difficult task to enforce. Corporate governance and risk management includes having standards, processes and systems to ensure safe and sound operations in accordance with the strategy of the bank. There must also be adequate internal controls and audits, appropriate risk management tools including capital and liquidity monitoring and evaluation of bank performance (Financial Stability Forum, 2001). An important aspect of corporate governance is related to the ownership structure and the monitoring of management, as already described in Section 2.2.2. The commercial banks have different incentives because they are owned by shareholders, who will get a share of the profit. This difference between ownership structure and the incentives, cause agency costs to be more likely in commercial banks than savings banks.

Based on the prior literature, the following research questions outline the primary focus of the paper.

RQ 1: Does deposit insurance induce a change in bank behaviour and risk-takings?

RQ 2: Do commercial banks behave differently than savings banks after the introduction of deposit insurance?

The first research question relates to whether or not banks changes their behaviour after deposit insurance was introduced in 1988, whereas the next question further compares the two types of banks and whether they differ in their risk attitude. Based on theory and prior literature, there is support for different outcomes of the analyses. Either there is no difference in the behaviour of the two types of banks (so both groups behave as before or they both change their approach to risk) or commercial banks changed behaviour and started taking higher risks after deposit insurance was introduced.

2.4 Methodology and Data

This section describes the data on Danish commercial and savings banks, the choice of variables and the analytical approach used in the paper.

2.4.1 Data

The analysis includes Danish banks and savings banks in the period between 1981 and 1992, where the deposit insurance scheme was approved in the parliament in December 1987, and going into effect in February 1988¹³. Data from the income statement and balance sheet has been hand-collected based on the annual reports from The Danish Financial Supervisory Authority.

Table 1 shows the total number of banks and the split between banks and savings banks. The decline during the period is primarily caused by mergers within and between the two types of banks. Some savings banks have also chosen to turn into banks (i.e. joint-stock ownership). A total of nine savings banks have chosen to do so during the years of analysis, and these have been removed from the sample because they probably had the *commercial bank mindset* even before the transformation.

The data on Danish companies are hand-collected from Greens¹⁴. The data contains key variables from the financial statement: *revenue, earnings before and after tax, extra-ordinary items, total assets, debt, dividends, equity and share capital*. Additionally, the data also contains the name of the bank connection. This information makes it possible to test if there is a difference

¹³See Bartholdy et al. (2004) for an overview of the events around introduction

¹⁴Greens has since 1883 collected information on Danish firms for the purpose of creating more transparency about ownership structure, financial statements and board members.

Table 1: Number of commercial and savings banks in Denmark

Year	Banks	Savings banks	Total
1981	74	157	231
1982	73	150	223
1983	73	151	224
1984	71	148	219
1985	72	147	219
1986	73	144	217
1987	76	141	217
1988	72	135	207
1989	70	128	198
1990	68	120	188
1991	68	118	186
1992	63	116	179

in the leverage of firms having either a savings bank or a commercial bank as the primary bank connection. Such an analysis will provide evidence on the willingness of the bank to issue loans.

Table 2: Descriptive statistics of firms based on bank connection

Variables	Commercial banks				Savings banks			
	Mean		Median		Mean		Median	
	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>	<i>Before</i>	<i>After</i>
log(Assets)	11.22	11.64	11.01	11.45	10.83	11.13	10.58	10.86
Revenue	2.49	2.09	1.73	1.51	2.02	1.91	1.75	1.62
ROA	0.05	0.03	0.04	0.03	0.03	0.03	0.03	0.03
Debt/Equity	26.51	32.21	9.33	8.83	30.69	13.47	7.73	5.62
Equity	0.31	0.32	0.30	0.31	0.29	0.30	0.26	0.30
Profit Margin	0.06	0.03	0.04	0.03	0.05	0.11	0.03	0.02
log(Revenue)	11.78	12.11	11.59	11.93	11.39	11.58	11.29	11.57
Debt	0.69	0.67	0.70	0.69	0.71	0.70	0.72	0.69
log(Debt)	10.78	11.18	10.57	10.99	10.43	10.74	10.26	10.52
ROE	3.20	4.30	0.55	0.39	1.21	0.55	0.36	0.27
Div Payout	1.15	1.28	0.33	0.45	1.04	1.04	0.30	0.70

The table provides mean and median values for the companies in the sample. The variables are the logarithm of assets, revenue to assets, return on assets, debt to shareholder equity, equity to assets, earnings before tax over revenue, log(revenue), debt to assets, logarithm of debt, return on equity and dividends to earnings after tax.

Descriptive statistics of the firms in the sample can be seen in Table 2. The table shows little difference between the customers of commercial banks and savings banks. Although a t-test and wilcoxon two sample test find significant changes between the pre and post deposit insurance period for some ratios, there are no differences found in a difference-in-difference analysis.

Table 3: Number of firms and bank connection

	Before	After
Commercial bank	771	775
Savings bank	58	54
Total	829	829
Multiple bank connections	166	71

Before is year 1986 and *after* is in 1993.

As seen from Table 3, the number of firms having either a commercial or savings bank has not changed significantly during the period¹⁵. One thing which has changed, is the number of firms having more than one bank connection. The number of firms having multiple bank connections have more than halved, but there can be multiple reasons for this.

2.4.2 Measures and Variables

There is no uniform approach for measuring bank behaviour in regards to moral hazard, and the challenge is to identify any difference from the *normal* behaviour of individual banks¹⁶. In this study, the moral hazard is defined by the risk-behaviour of banks. If the bank takes higher risk after deposit insurance is introduced, this is a sign of moral hazard. Risk can be defined in various ways; capital market measures of risk¹⁷ or accounting based risk measures.

Signs of moral hazard would be seen in a change in lending because more risky banks would invest more in high-risk projects, and consequently the customers would more easily obtain funding for new projects. Carapella and Giorgio (2004) find banks to increase their lending after introduction of deposit insurance across 55 countries, an increase which is not backed up with a similar increase in deposits. To define risky lending of banks in detail, it is necessary to have detailed information on the lending portfolio. To give an example, a bank giving loans to few industries is very exposed to changes within the particular industry and therefore more risky than banks which are very diversified in their lending portfolios. It is simply a question of spreading the risk. In Denmark, there are various examples of banks having

¹⁵This could be caused by *relationship banking*, where the bank develops a personal relation to the client (and collects private information), resulting in a long-term relation.

¹⁶See Demirgüç-Kunt et al. (2008c, Section 3.2) for possible moral hazard measures on a country level; the coverage ratio, foreign currency deposits covered, interbank deposits covered, coinsurance, payment type, risk-sensitive premium, public managed administration and voluntary membership.

¹⁷see e.g. Saunders et al. (1990) and Konishi and Yasuda (2004)

many customers within one industry, for example real estate or agriculture, making them very vulnerable to a decline in house-, land- and farm-prices.

Another interesting aspect is the ratio of lending to new versus existing customers. Bank-borrower relationships are well known from literature as a way of mitigating moral hazard because of private information (Boot and Thakor, 1994). Unfortunately, we do not have detailed data on for example lending to different industries, but only the totals as stated in the financial statements collected from the Danish Financial Supervisory Authority.

Risk measures

The focus of this study is to detect a change in behaviour of the management of the bank. The first place to look for consequences of a more risky attitude of banks is the loan loss provisions (LLP) in the income statement. If LLP to loans increases, this is a sign of risky behaviour because increased investments in risky projects also results in an increase in LLP (Lepetit et al., 2008). The standard deviation of each banks' ROA and ROE has also been used as risk measures in prior literature, because a high volatility is a sign of higher risk takings (Cebenoyan and Strahan, 2004; Lepetit et al., 2008)

In relation to deposit insurance, one concern is liquidity (caused by the mismatch of maturities on the asset side versus liability side of the balance sheet) and insolvency of the bank, potentially resulting in bank failure. Regarding risky behaviour of banks, it is therefore obvious to include measures on the likelihood of bank failure, i.e. insolvency problems. Wheelock (1992) finds the lower the variables surplus/loans, bond/asset, reserve/deposit and deposit/asset, the higher likelihood of bank failure, based on an analysis of the voluntary deposit insurance in Kansas in the 1920s. The Z-score¹⁸ has also been used in literature to indicate the probability of bank failure (Boyd and Graham, 1986; Laeven and Levine, 2006; Lepetit et al., 2008).

If the Danish commercial banks show signs of moral hazard as opposed to the savings banks, then this would be seen in the following variables of analysis: LLP to total loans, loans to assets, standard deviation of return on equity, bonds to assets, and deposits to assets. These measures of risk, which are chosen based on prior research, are expected to identify if there is any change in behaviour of banks based on the introduction of explicit deposit insurance in 1988. Except for bonds to asset, the variables are expected to be positively affected by deposit insurance in case of moral hazard. For bonds, the relation is expected to be negative because a lower bonds to asset ratio increases the likelihood of bank failure.

¹⁸Calculated as $(100 + \text{average ROE} / \text{SDROE})$ where ROE and the standard deviation of ROE are expressed in percentage. The higher the Z-score, the lower probability of failure

Independent variables

Following Saunders et al. (1990), we use capital to assets as a control variable. The rationale for using this variable is that a highly leveraged firm tends to exhibit greater variations in stock return, hence a high capital to assets ratio (i.e. low leverage) would be negatively related to risk. This is supported by Furlong and Keeley (1989), who show how higher capital requirements reduce the incentive for banks to increase asset risk.

Size of the bank, measured by the logarithm of assets, is also included as a control variable. Prior research has shown that large banks lend a greater fraction of their assets than the small banks do, but research also suggest that large and small banks serve different borrowers. The small banks tend to lend more to small and less established companies based on *soft information*, whereas larger banks tend to lend more to large and well established firms (Thakor and Boot, 2008, Chap.4). Generally, large banks are more diversified than smaller banks, but Demsetz and Strahan (1997) show that large bank holding companies use their advantage of diversification to engage more in risky, potentially high return lending.

Variables affecting capital structure

The research field of capital structure is enormous, and factors found to effect capital structure of firms are numerous. Although research has identified a large number of variables which potentially affects capital structure and the empirical findings in general are consistent with theory, there are relatively few *general* determinants of capital structure (Harris and Raviv, 1991).

In a seminal study by Rajan and Zingales (1995), they test if variables known to affect capital structure of American firms also provide significant results when based on international data. The variables they find to effect capital structure are fixed to total assets, market to book values, size (measured as log sales) and profitability (measured as EBITDA over book value of total assets). The dependent variable is debt to book and market capital. Because of limited data on firms, the variables used in this study are size, measured as logarithm of assets, and profitability as the ratio of P/L before tax to total assets¹⁹.

In most countries size is positively related to leverage, which may be explained by lower information asymmetry of larger compared to smaller firms (Rajan and Zingales, 1995). Although size is found to be correlated with leverage, there is no clear understanding of why this is the case. Profitability is expected to be negatively related to leverage.

¹⁹Additional variables, which are relevant to include in the study (if we can get the data) are the probability of bankruptcy, non-debt tax shield, fixed to total assets and growth opportunities (Harris and Raviv, 1991, Table IV). Ozkan (2001) use variables such as growth opportunities (as MV assets to BV assets), non-debt tax shield (annual depreciation expense to total assets), Liquidity (current assets to current liabilities)

2.4.3 Research Design

The primary interest of this study is to test whether banks and savings banks changed their behaviour in regards to risk-takings after the introduction of deposit insurance. This will be shown by three different analyses.

The first analysis is a univariate model where mean values from the pre- and post 1988 period are tested for significant changes. This analysis will contain a parametric two-sample t-test as well as a paired t-test. These tests are based on the assumption of normality in the data, for the results to be robust²⁰. We will not only show the difference of banks and savings banks respectively, but also perform a difference in difference analysis showing whether the two types of banks behave different from each other (Greene, 2012, p.195 ff.). The difference in difference is measured by

$$E = [(\bar{y}|bank = 1, DI = 1) - (\bar{y}|bank = 1, DI = 0)] - [(\bar{y}|bank = 0, DI = 1) - (\bar{y}|bank = 0, DI = 0)] \quad (1)$$

The value E will show if there is a difference between commercial banks (bank=1) and savings banks (bank=0) after deposit insurance has been implemented (DI=1). If E is significantly different from zero, then the two types of banks differ in their behaviour. For example, if commercial banks increase their lending more than savings banks after deposit insurance is introduced, then E_{loans} will be larger than zero.

The second test is a multivariate model using unbalanced panel data to analyse whether deposit insurance has an effect on bank behaviour.

$$Risk_{it} = \alpha_t + \beta_1 DI_t + \beta_2 Bank_i + \beta_3 DI \times Bank_{it} + \beta_4 Size_{it} + \beta_5 Capital_{it} + \gamma' \mathbf{m}_t + \varepsilon_{it} \quad (2)$$

Where $Risk_{it}$ is the risk-taking behaviour of bank i in year t . DI_t is an indicator variable of 1 if deposit insurance is implemented, i.e. covering years 1988 to 1992, and $Bank_i$ is also an indicator variable equal to 1 if the bank i is a commercial bank and 0 otherwise. This variable is constant over time because those savings banks who converted into a commercial bank has been removed from the sample before running the analyses. The variable of interest is the interaction term $DI \times Bank_{it}$, hence the risk-taking of banks after deposit insurance was implemented. We control for the size of bank, $Size_{it}$ as the logarithm of assets, and capital to assets. Lastly, \mathbf{m} is a vector of macroeconomic variables which could be affecting the bank behaviour, including GDP, inflation, unemployment, the 10 year interest rate on government bonds and the banks' interest rate to the Danish National Bank.

²⁰For now, the data is assumed to be normally distributed.

The data consist of time series (year 1981-1992) for each cross section of banks. There are, however, gaps in the data, which result in an unbalanced sample. The savings banks, who chose to transform into commercial banks after 1988, have been removed from the sample, and banks with less than three years of observations have also been eliminated before running the panel data analyses.

When dealing with time series of cross sections, there is most likely a problem of unobserved heterogeneity, meaning that the error term is correlated with the explanatory variables. This occurs because the error term includes not only an idiosyncratic error but also a bank specific error which is constant during the time period. One way to mitigate this is to eliminate the bank specific error, which can be done by using first differencing or a fixed effect model. The goal of these two models are alike, namely to eliminate the unobserved effect prior to estimation, but the choice between the two methods depends on whether the error terms are serially correlated. If there is no or only little autocorrelation in the error terms, then the fixed effect model should be used.

If there is reason to believe that the error terms are not correlated with one or more of the explanatory variables, then the random effects model is most appropriate. Testing the random effect versus the fixed effect model is performed with a Breusch Pagan Multiplier test with the null hypothesis that there are no random effects. If this is rejected, then the Hausman test should also confirm the results. If the null hypothesis of the Hausman test, that the individual effects are uncorrelated with other regressors in the model, cannot be rejected, this confirms the use of random effects model (Wooldridge, 2009). In case of serially correlated error terms, it might be more appropriate to use an AR(1) model which can be estimated with random as well as fixed effects (Baltagi and Wu, 1999).

There are some caveats when dealing with an unbalanced dataset. Firstly, an obvious consideration is the reason for the unbalance. The banks leaving the sample is probably not random, but probably those with worst performance. However, since the period is characterized by mostly mergers as opposed to failures, the attrition-problem is probably not too severe. Secondly, because of the unbalance, some subjects are overrepresented in the analysis compared to others. It is, however, not a viable solution to remove the banks with few yearly observations to create a more balanced sample, because this creates a selection problem.

As a third analysis, we analyse the clients in the commercial banks versus the savings banks to test if they have changed their debt-structure after the introduction of deposit insurance. This analysis is possible because of available data on bank-client relations during the same time period. The analysis is an unbalanced panel data regression with firms capital structure

as dependent variable.

$$D/E_{it} = \alpha_t + \beta_1 DI_t + \beta_2 BANK_{it} + \beta_3 DI \times BANK_{it} + \gamma' \mathbf{x}_{it} + \varepsilon_{it} \quad (3)$$

Where D/E_{it} is the debt-equity ratio for firm i in year t . DI_t and $BANK_{it}$ are indicator variables as in Equation 1. The interaction term between DI and $BANK$ is still the primary variable of interest, where this will increase if commercial bank shows higher willingness to lend out money after the implementation of explicit deposit insurance. γ is a $k \times 1$ vector of parameters and \mathbf{x} is a vector of variables known to prior literature to affect capital structure (Rajan and Zingales, 1995).

2.5 Preliminary results

Results for the pre- and post comparison of commercial and savings banks including a difference-in-difference analysis is given in Table 4. This shows that commercial banks increase their loans to assets more than savings banks after deposit insurance was implemented. Whether this increase in loans is because the banks give out more *risky* loans cannot be concluded based on the data available, however, this paper includes various analyses, which should be seen in combination. An increase in loans when compared to assets is present and also significantly different between the two types of banks, but the loans to deposit ratio does not increase as found by Carapella and Giorgio (2004). Although insignificant, this indicates that the increase in loans is fully backed with a similar or even higher increase in deposits. as indicated by Carapella and Giorgio (2004), this could be caused a high institutional quality of Danish banks.

The ratio of bonds to assets is significantly lower for commercial banks than savings banks. Following Wheelock (1992), banks with lower ratios have higher likelihood of bank failure. In our setting, we are not testing the probability of failure, however, this variable could also indicate commercial banks being more risk seeking after deposit insurance is introduced.

The difference-in-difference test also shows significance in the spread between assets and liabilities, indicating that the liabilities have increased relatively more than assets for commercial banks when compared to savings banks. Finally, interests on loans relative to total interest income increases more for commercial banks than savings banks. It is not surprising to see that interest on loans increases for commercial banks because they experience an increase in loans, where savings banks, on the contrary, experience a decline in loans to assets. The total interest income does, however, increase for both commercial and savings banks.

When dividing the sample into small and large banks based on the grouping done by the Danish Financial Supervisory Authority, we see that small banks in general are driving the results. For large savings banks, the bond to

Table 4: Mean values before and after deposit insurance

Variable	Commercial banks			Saving Banks			
	Before	After	Diff (i)	Before	After	Diff (ii)	(i)-(ii)
<i>Number obs</i>	512	341		974	574		
Loans	0.41	0.48	0.07***	0.51	0.48	-0.03***	0.1***
Deposits	0.53	0.58	0.04***	0.75	0.77	0.01	0.03
Capital	0.10	0.13	0.03***	0.13	0.14	0.01*	0.02
Income/Loans	0.01	-0.09	-0.1	0.03	0.01	-0.02***	-0.09
Reserves/Deposits	0.68	0.54	-0.14***	0.93	0.88	-0.04*	-0.09
Bonds	0.25	0.21	-0.04***	0.26	0.27	0.01*	-0.06*
IntInc/IntExp	1.78	2.69	0.91	1.78	2.10	0.32***	0.59
Assets/Liabilities	1.44	1.39	-0.04	1.37	1.98	0.6*	-0.65*
Income	0.01	0.00	-0.01***	0.15	0.14	-0.01***	0.002
IntDep/Deposits	0.09	0.07	-0.02***	0.16	0.07	-0.09	0.07
LLP/Loans	0.03	0.04	0.01***	0.02	0.03	0.003*	0.01
Loans/Deposits	1.30	0.91	-0.39	1.35	0.65	-0.69	0.31
IntLoans/IntInc	0.61	0.68	0.07***	0.67	0.63	-0.04***	0.11***
Size	13.93	14.21	0.28**	10.77	11.00	0.22**	0.06

The table provides an overview of selected ratios of commercial banks and saving banks in mean values before and after the introduction of deposit insurance. The variables are loans to assets, deposits to assets, capital to assets, total income to loans, reserves to deposits, bonds to assets, interest income to interest expenses, income to assets, interest on deposits to total deposits, loan loss provisions to loans, loans to deposits, interest on loans to total income in interest and size is $\log(\text{assets})$. The table shows significance levels for a two-sample t-test but the paired t-test shows similar results. ***, ** and * denotes a significance at 1%, 5% and 10% respectively. The difference in difference results are based on a simple t-test.

asset ratio is significantly negative as opposed to the positive overall result of 0.013. The loans to deposits, which is negative but insignificant, shows a significant *positive* change for both types of *large* banks²¹. The indication of an increase in loans to deposits of large banks, contradicts the results of Gropp and Vesala (2001), who find large banks to decrease their level of risk after deposit insurance is introduced.

Table 5 contains the results of the primary analyses of this paper, namely the panel data models of bank behaviour. The variable of interest is the interaction term between bank and deposit insurance, indicating the affect on the dependent variable for commercial banks after deposit insurance is introduced. If the hypothesis holds, that commercial banks take more risk because of the changed incentives, this interaction term would be significantly positive for all variables except bonds to assets.

Except for deposits to assets, all variables of analysis are found to be sig-

²¹Tables of the mean values when divided on bank size is not included in this paper because the results are very similar and shows the overall differences to be driven by small banks.

Table 5: Panel data analysis on bank behaviour

Variables	LLP	Bonds	SdRoe	Loans	Deposits
DI	-0.006* (0.003)	-0.012 (0.01)	-2.748*** (0.215)	-0.005 (0.012)	0.022 (0.015)
DI*Bank	0.009** (0.004)	-0.057*** (0.012)	2.488*** (0.285)	0.053*** (0.016)	0.017 (0.019)
Capital	-0.171*** (0.022)	0.9*** (0.041)	-0.391 (1.118)	2.703*** (0.053)	4.311*** (0.066)
Size	-0.009*** (0.002)	-0.008 (0.007)	-0.457** (0.187)	-0.018* (0.01)	-0.031** (0.012)
Unemp	0.004*** (0.001)	0.016*** (0.003)	-0.002 (0.058)	-0.015*** (0.004)	0.004 (0.005)
NB rate	0.004*** (0.001)	0.002 (0.004)	-0.004 (0.053)	0.025*** (0.005)	0.016*** (0.006)
Inflation	0.001 (0.001)	0.02*** (0.004)	-0.012 (0.061)	-0.01** (0.004)	-0.008 (0.005)
GDP	-0.004*** (0.001)	0.008*** (0.002)	-0.002 (0.022)	-0.005** (0.002)	0.004* (0.002)
Long Int	-0.001 (0.001)	-0.014*** (0.002)	-0.003 (0.031)	0.004 (0.003)	0.001 (0.004)
Number obs	1804	2108	1752	2128	2125
R-squared	0.1035	0.2822	0.1321	0.6261	0.7347

The is a fixed effect AR(1) model, as derived in Baltagi and Wu (1999). This approach is found most appropriate when there are serially correlated error terms. We have chosen to apply the same model on all regression to be persistent. LLP to loans could also be performed based on a normal fixed effect model however, the results are very similar but with a lower R-squared. SdROE and Bonds to assets does not rejects the Hausman test, meaning that these could also be based on a random effect AR(1) model. With bonds as dependent variable, Size returns a significant positive relation to the bond-asset ratio, but otherwise the two models are very similar. The dependent variables are LLP to loans, loans to assets, standard deviation of ROE, bonds- and deposits to assets. The independent variables are indicator variables of deposit insurance, commercial bank and the interaction between the two, capital to assets, log(assets) and macroeconomic variables; unemployment, rate to the national bank, inflation, GDP and the 10 year interest rate on government bonds. Standard errors are in parentheses. ***, ** and * denotes a significance at 1%, 5% and 10% respectively.

nificant and with the predicted sign. Loan loss provisions from the income statement increase relatively more than assets, which indicates that the attitude of commercial banks towards risk is more pronounced after deposit insurance. The risky behaviour is also confirmed by a significant increase in the standard deviation of ROE, a measure which has been used widely in prior literature as an indicator of risk taking (see section 2.4.2). The bonds to asset ratio is significantly negative for commercial banks, a measure known to influence the probability of bank failure, and therefore seen as a measure of risky behaviour in our context. Finally, loans and deposits relative to total assets are both positive for commercial banks after explicit deposit insurance is implemented in Denmark. These variables do not as such indicate risky behaviour of banks, but confirm that loans and deposits increases for commercial banks in the post period (however, not significant for deposits to assets).

It is interesting to see that the introduction of deposit insurance does not result in a risky behaviour *per se*, a result also found by Ngalawa et al. (2011). The results also show that the introduction of deposit insurance cause a 2.748 lower standard deviation on ROE, i.e. lower risk, but for the commercial banks the standard deviation on ROE increases significantly in the post period. Prior research finds a higher capital ratio to be negatively related to risk takings of the banks. We do find some support for this because an increase in capital ratio decreases LLP significantly. Additionally, the relation between bonds to assets and capital to assets is positive, indicating a more conservative risk profile. The results also indicate that size is negatively related to risk, the larger the bank, the more risk averse behaviour of the bank. The macroeconomic variables included in the analyses are found to have significant influence on the behaviour of banks, which is also expected.

The arguments *against* finding a difference in behaviour of the two types of banks after deposit insurance is implemented, do not seem to hold. Although Denmark at that time was considered to have a healthy banking system with prudential regulation and strong creditor rights²², it still seems that *commercial banks* take advantage of the introduction of deposit insurance by increasing the risk. However, for *all* Danish banks, the introduction does not seem to cause a change in the risk attitude maybe because of an already existing implicit deposit insurance.

As seen in Table 6, we also find significant results of the third analysis of the paper, i.e. the capital structure of firms being either a commercial or savings bank customer. Deposit insurance does not cause any increase in

²²See Pozdena (1992), Bernard et al. (1995) and Bartholdy et al. (2003)

Table 6: Factors affecting firms' debt to equity ratio

Variables	Coefficients	Std. errors	T-statistics
DI	-19.54	6.01	-3.25
DI * Bank	21.44	6.18	3.47
Profitability	-0.16	4.16	-0.04
Size	16.81	1.55	10.85
Number of firm-year obs	4947		
Number of firms	760		
R-squared	0.030		

Panel analysis on firms' capital structure. According to the Breusch-Pagan test, the appropriate model is fixed effect. There is a problem of serially correlated error terms which is why a first differencing model is used.

debt to shareholder equity, but on the contrary the relation is negative. For those firms being customers of commercial banks, the introduction of deposit insurance resulted in a significantly positive effect on their debt to equity ratio. Supporting the findings of Rajan and Zingales (1995), we find firm size to be positively related to leverage, and profitability is negatively related (although insignificant). Unfortunately, we do not have enough data to include more variables known from prior literature to effect capital structure.

2.6 Preliminary conclusion

This paper contains three sets of analyses for testing the behaviour of Danish commercial banks versus savings banks after explicit deposit insurance was introduced in 1988. The first analysis is a pre- and post test including a difference-in-difference, which shows some dissimilarities between the two types of banks. The second analysis is a panel regression, testing the effect of deposit insurance on different measures of bank risk. Thirdly, the paper links the behaviour of banks caused by deposit insurance to the companies who are customers of the specific banks.

The analyses show that commercial banks *did* induce a more risky attitude after deposit insurance was introduced. The risky attitude can especially be seen in an increase in loan loss provisions to assets, increased volatility of the standard deviation of ROE, and a decrease in bonds to assets. The increase in debt-equity ratios of firms who are customers of commercial banks, also confirms the excessive lending-behaviour of the Danish commercial banks.

3 Bank Regulations and the Financing of SMEs

The second paper examines if and how small- and medium-sized enterprises are affected by regulatory initiatives for the banking industry, and whether the tight regulation of banks leads to credit crunches.

3.1 Motivation

Access to bank credit is of great importance especially to non-listed SMEs, which have limited possibilities of obtaining finance elsewhere in the market. The Basel framework and the increased focus on banks, especially during the financial crisis, make not only regulations a highly relevant and central issue, but the consequences of these and the impact on society are also relevant. It is important to realise that regulations not only affect banks, but also firms and the society as a whole. This makes it essential not only to focus on how regulations affect banks, but also to bring attention to the next link in the chain; how do the regulations affect the companies depending on bank credit?

3.2 Data and Methodology

This research will achieve its purpose by analysing the effect of country-specific bank regulations on the capital structure of private and public firms. Do bank regulations cause a credit crunch for private firms as opposed to public firms? The data is from Orbis containing information from financial statements of European small- and medium-sized companies. Information on the country-specific regulations are based on multiple sources²³. The primary model to be analysed is the following

$$D/E_{ijt} = \beta_0 + \beta_1' \mathbf{x}_{jt} + \beta_2' \mathbf{z}_{ijt} + \beta_3' \mathbf{g}_{jt} + \beta_4' \mathbf{m}_{jt} + \varepsilon_{ijt} \quad (4)$$

Where the dependent variable is the leverage of firm i in country j at time t . The vector \mathbf{x} contains the regulatory characteristics of the specific country in the specific year, hence these are the variables of interest in the analysis. The following variables include a vector of firm-specific control variables known to affect the capital structure of firms, \mathbf{z}_{ijt} , control variables of governance factors in the specific country and year, \mathbf{g}_{jt} , and finally, \mathbf{m}_{jt} contains macro-economic control variables such as short- and long interest rates, inflation and GDP growth.

Prior to the implementation of Basel II and the capital requirements directive, European SMEs were concerned about the possible consequences for them. The Centre for European Policy Studies has published a report, which describes how the regulations can influence firms (Ayadi, 2006). The

²³See Demirgüç-Kunt et al. (2009), Barth et al. (2004), Caprio et al. (2007) and Laeven and Levine (2009)

report clearly states, that there will be an impact on the credit conditions for SMEs, but not necessarily a reduction of credit supply. Based on Spanish data Saurina and Trucharte (2004) concludes that the implementation of Basel II would not seem to cause a change in the pattern of banking credit to SMEs. A survey of 91 banks across 45 countries concludes that banks do not consider prudential regulations a hurdle and they generally find the SME segment to be very profitable (Demirgüç-Kunt et al., 2008a).

The purpose of this paper is to verify or reject that SMEs are influenced and restricted in their business by regulatory initiatives for banks.

4 How does the Financial Health of Banks Affect their Corporate Customers?

As an extension of my previous research, this study links the individual bank to the specific companies who are obtaining loans in that particular bank, and test if and which of these clients are subject to a credit crunch. A special feature of this study is the unique Danish data of bank-firm relations, hence this study can provide evidence on the direct effects on firms, based on individual bank characteristics. The analysis can provide an answer for the following question: which clients of the bank are influenced first and most by potential financial problems of the bank? The model to be tested is similar to the model in the previous article, however, this study is based on Danish firm-level data.

$$D/E_{it} = \beta_0 + \beta_1' \mathbf{x}_{it} + \beta_2' \mathbf{z}_{it} + \varepsilon_{it} \quad (5)$$

where D/E_{it} is the debt-equity ratio of firm i in year t . The variables of interest are contained in the vector \mathbf{x} , i.e. the bank-specific characteristics, and the firm-specific control variables known to influence capital structure²⁴ are included in vector \mathbf{z} .

In this study we will take advantage of the recent turbulent times within the Danish banking industry where many banks have been under financial pressure. The analysis will therefore be able to provide evidence on the consequences for firms when financial problems arise for their primary bank connection. The comparisons will be made by splitting the firm sample into different groups e.g. public versus non-public, large versus small, high versus low growth.

²⁴Following Rajan and Zingales (1995), the variables to include are fixed to total assets, market to book value, size and profitability

5 Earnings Quality of Danish Banks and their Corporate Customers

The primary question of this study is *Do good banks also have the good customers*²⁵? It is worthwhile studying this because the results can be used in future studies analysing the causality of bank-client relations; are good banks better at finding and attracting the good clients or do good firms select to become customers in the good banks. High earnings quality is when the financial statement provides an accurate description of the financial situation of the firm.

There are numerous measures of earnings quality in the literature, and there are many measures which are only applicable for either financial or non-financial firms. Measures for earnings quality of non-financial firms are primarily based on persistence and predictability of accruals and earnings. Various models have been developed for testing earnings quality, for example the Jones Model (Jones, 1991) and the Dechow-Dichev Model (Dechow and Dichev, 2002). Earnings management, such as smoothing of earnings and small loss avoidance, are also used in literature for testing earnings quality of non-financial firms.

Testing earnings quality in banks can in some situations not be based on the same measures as the non-financial firms. For banks, earnings quality is often tested based on discretionary security gains and losses as well as discretionary loan loss provisions. The reason for testing on discretionary items is to identify if management time the realisation of e.g. security gains and losses for example by selling off securities at a higher price than book value to boost earnings or to offset a high loan loss provision. Barth et al. (1990) find a negative market reaction to realised security gains, hence the market identifies security gains as a way to smooth income.

As an additional aspect, the analysis will include the transition from local GAAP to IFRS in 2005, which will show whether there is a spill-over effect on local GAAP-clients when their bank started reporting according to IFRS. The literature on the transition to IFRS provides evidence on a higher quality of financial statements, but this has primarily been studies for non-financial firms and not in a setting with bank-client relations. In a recent paper by Gebhardt and Novotny-Farkas (2011), mandatory IFRS is found to increase earnings quality of banks (income smoothing is significantly reduced), however, the results are less pronounced in countries of strict bank supervision, dispersed bank ownership and if the bank is cross-listed in the US.

²⁵We define *good* as high earnings quality.

The model of analysis is the following

$$EQ_{firm} = \beta_0 + \beta_1 EQ_{bank} + \beta' \mathbf{x} + \beta_3 IFRS_{bank} + \varepsilon \quad (6)$$

If banks with high earnings quality (EQ) also have customers of high earnings quality, then the relation should be significantly positive. The vector \mathbf{x} are control variables which are found to affect earnings quality²⁶. Lastly, $IFRS_{bank}$ is an indicator variable equal to 1 if and when the specific bank change to IFRS, and 0 for local GAAP.

In general, there is limited research on the link between banks and their customers because of limited data, so this study will hopefully bring interesting contributions to the literature.

²⁶Gaio (2010) find several firm-level variables to have a significant effect on earnings quality of firms. These include size, volatility of cash flows from operations, standard deviation of sales, the length of the operating cycle, frequency of negative earnings, investment opportunities, insider ownership, the logarithm of book to market equity, leverage and ROA.

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Appendix A: Formal requirements

A.1 PhD courses

I have completed the following courses during the first year of the PhD programme summing up to 31 ECTS:

Studies in Behavioural Accounting Research	<i>4 ECTS</i>
<i>Professor Stephen K. Asare</i>	
Aarhus University, Business and Social Sciences	
Applied Quantitative Methods, Intermediate Econometrics II	<i>3 ECTS</i>
<i>Professor Keld Laursen</i>	
Copenhagen Business School	
Commodities and Commodity Derivatives	<i>2 ECTS</i>
<i>Professor Helyette Geman</i>	
Aarhus University, Business and Social Sciences	
Qualitative Research and Case Study Research in Accounting	<i>5 ECTS</i>
<i>Professor Robert W. Scapens</i>	
Aarhus University, Business and Social Sciences	
Introduction to Empirical Accounting Research	<i>4 ECTS</i>
<i>Professor Wayne Landsman</i>	
Aarhus University, Business and Social Sciences	
Banking	<i>6 ECTS</i>
<i>Professor Lucy White and Professor Charlotte Østergaard</i>	
BI Norwegian Business School/NHH	
Intensive PhD seminar in Financial Accounting	<i>4 ECTS</i>
<i>Professor Ole-Kristian Hope</i>	
NHH Norwegian School of Economics and Business Administration	
Real Options	<i>3 ECTS</i>
<i>Professor Lenos Trigeorgis</i>	
Aarhus University, Business and Social Sciences	

A.2 Teaching activities

At this time, I have been teaching 340 hours of the required 570 hours which is divided between the following activities:

- Financial Accounting (BSc level, Spring 2011)
In the student evaluations, I scored 4.1, 4.2 and 4.4 on a 5 point scale based on three classes and 62 students.
- International Financial Accounting I (MSc level, Spring 2011)
- International Financial Accounting II (MSc level, Spring 2011)
- Correcting exam papers in Corporate Finance I (MSc level, Fall 2010 and Fall 2011)

A.3 Presentations

I have presented my research ideas and the first working paper on the following occasions:

- January 2011 *Finance Research Group* Aarhus University, Business and Social Sciences
- April 2011 *Accounting Research Center* Aarhus University, Business and Social Sciences
- October 2011 *The annual research day of the Finance Research Group* Aarhus University, Business and Social Sciences
- November 2011 *The annual DGPE workshop* Sandbjerg Estate

A.4 Stay abroad

I have not found a university to visit yet, but the change of environment will be in fall 2012. I have contacted a few universities but with no luck so far. I am focused on finding a department where there is ongoing work within financial institutions but it is also important that there are interesting PhD courses and an active PhD environment. Possible universities where they have faculty members within my areas of interest are:

- Kellogg School of Management
- University of Chicago, Booth School of Management
- Olin Business School, Washington University in St.Louis

A.5 Conferences and workshops

I have participated in the following conferences:

- The Nordic Conference on Financial Accounting (Copenhagen)
- Management and Accounting in Financial Institutions (Workshop at Aarhus University, Business and Social Sciences)
- Nykredit Symposium (Copenhagen)
- D-CAF Fifth Interdisciplinary Accounting Conference (Copenhagen)
- Workshop of the ICFR PhD Network on Financial Regulation (Bank of England)