COPENHAGEN BUSINESS SCHOOL, 2016

The effects of banks' health on the growth and leverage of their corporate customers

A quantitative study of Danish firm-bank relationships between 2008-2013 in the context of the global financial crisis and international banking regulation

Authors:

Antonia Mihaela Draghici

and

Paula Cristina Stef

Supervisor:

Thomas Poulsen

Master Thesis submitted in partial fulfillment
of the requirements for the degree of

MSc in International Business (Cand.Merc.)

May 30, 2016

Pages: 101 - Characters: 229,874 (incl. spaces)

Executive summary

The uniqueness of the banking sector and its ability to amplify shocks to the real economy has raised progressively more attention from both proponents of increased banking regulation and those in favor of a more relaxed regulatory environment. The transmission of bank distress to nonfinancial firms has given rise to a growing body of literature, where the health of the financial intermediary has real impact on borrowing firms. Considering the ramifications of bank health, which can in certain circumstances, lead to systemic failures, the proliferating nature of banking regulation is understandable. However, banking regulation, may at times hinder economic growth as opposed to advance it, and thus we argue a better understanding of the transmission of bank health, can pave the way for a more perceptive banking regulation, one which is grounded in real outcomes.
To this end, we seek to provide empirical evidence on the effects of bank health on firm outcomes, addressing both the width and the depth of the impact.

Our endeavor to answer the research question is grounded in an exploratory panel data study with a starting point in a review of bank health transmission as well as current and impending banking regulation. We document the macroeconomic and regulatory developments in Denmark during the period of interest, 2008-2013, to delve into the nature of the environment governing banks and firms. Through an assessment of existing studies of bank health transmission we build a comprehensive research of six firm outcomes spanning capital structure and growth. Granting to a unique opportunity, we advance an identification strategy that allows us to uncover the effects of regulatory capital injunctions to several Danish banks in 2010. We supplement the study of the injunction with a Z-score measurement of bank health for the period 2008-2013 period on an extensive dataset, which provides us the ability to pair firms and their primary lenders.

The empirical analysis uncovered a significant effect of unhealthy banks, measured through the injunction, impacting firms' leverage, interest expense, cash holdings and asset growth, while the Z-score proved itself a less conducive measure of analyzing bank health impact. Thus we evidence that unhealthy banks cause almost 5% less firm leverage, 24% increases in interest expense while cash holdings increase by 2.7% and a clear contraction in asset growth of 6.3%.
The documentation of these effects provide further empirical evidence of the bank balance sheet channel as well as an insight in the transmission of bank health and banking regulation on the real economy.

Keywords: *Bank Health, Capital Structure, Firm Growth, Financial Regulation, Capital Requirements, Credit Supply, Capital Injunctions*

Aknowledgements

We would like to thank our supervisor, Thomas Poulsen for guidance, inspiration and invaluable advice, and also the "Nordic Finance and the Good Society" project for granting us access to the data.

We are as well grateful to our families and friends for their continuos support and heartfelt encouragements throughout the writing of the thesis.

Table of Contents

List of figures

List of tables

1. Introduction

1.1 Background

The effects of bank shocks have drawn increasingly more attention after the Great Depression, when waves of bank failures eventually culminated in the shutdown of the banking system. The unusual length and depth of the Great Depression probed the question of non-monetary effects, which might explain the collapse of U.S. economic productivity for such a lengthy period of time. Systemic bank failures were then documented to have caused these non-monetary impacts, which disrupt credit flows in the financial intermediation process and exacerbate declines in economic activity (Anari & Kolari 1999). Bank runs on insolvent banks, characterized as a loss in public confidence and a rush by depositors to withdraw their deposits as they expect banks to fail, created a contagion effect onto solvent banks (Kaufman 1994). In response to the contagion effect and faced with rising firm bankruptcies, solvent banks then curtailed lending and shifted funds to liquid assets. Chronic and severe bank failures were thereafter exposed to seriously disrupt the financial intermediation process and potentially have pervasive adverse effects on the economy.

Increased focus on banking regulation was meant to prevent such chronic and severe bank failures, which can have an overreaching effect on the economy. However, critics (Moosa 2010) argue that it was the very same regulation that was meant to prevent a systemic financial distress that stood at the very heart of the banking sector collapse in 2007-2009.

Prior to the 2007-2009 financial crisis a pro-cyclical regulation on financial institutions, the pressure of the banking industry to extend loans and the complexity of newly designed synthetic products have set the scene for the significant loss on mortgage defaults and the interbank lending freeze which eventually led to a reduction in credit to consumers and businesses. Ivashina & Scharfstein D (2010) document that new loans to large borrowers fell by 47% during the peak period of the financial crisis, fourth quarter 2008, relative to the prior quarter and the run on the banks was characterized both by short term bank creditors rendering the bank unable to roll over its short term debt, and at the same time a run by borrowers who drew down their credit lines. Their research finds evidence that banks cut their lending less if they had better access to deposit financing and not as reliant on short-term debt, thus providing proof of the effect of the bank financial health on the supply of credit to the corporate sector.

The transmission of bank distress to nonfinancial firms was documented on a larger scale during the financial crisis, where research has shown that bank distress is associated with equity valuation losses and investment cuts to borrower's firms in 34 countries (Carvalho et al. 2013). Furthermore, the transmission of bank distress represents a global phenomena with the collapse of a bank in one country having overreaching effects throughout the globe, as evidenced by the collapse of the Lehman Brothers and its effects on Portuguese banks' credit reduction (Iyer et al. 2014), the 1998 Russian default and its effects on Peruvian banks (Schnabl 2012) or the Japanese banking crisis effect on US economic activity (Peek & Rosengren 2000).

In the context of the global financial crisis and new international regulatory standards, we identify bank health to be at the center of ensuring financial sector stability and seeing that its transmission can have a global impact we deem it imperative to bring empirical evidence to the growing body of literature studying bank health effects on the real economy.

To this end, we study the impact of banks' financial health in Denmark throughout the period 2008-2013 on a number of firm outcomes and argue that our work can further contribute to mapping the extent of the effects on the real economy. Our research is organized as follows: Section I consists of the introduction and methodological considerations, Section II reviews the literature, Section III presents the identification strategy and hypotheses, Section IV describes the data, Section V undertakes an analysis using firm-bank level matched data, Section VI discusses the empirical results, Section VII concludes and offers perspectives on our findings.

1.2 Problem statement and Research Question

Considering the fact that the ramifications of bank health can lead so far as to create systemic failures, the proliferating nature of banking regulation is understandable. Be that as it may, more conservative and rigorous regulation does not necessarily advance economic growth; it might, on the contrary, hinder it. The better the understanding of the transmission of bank health, the more grounded in real outcomes the foundation of regulatory frameworks can be.

Empirical evidence on the effects of bank health may provide the insight needed to develop more perceptive banking regulation to strengthen the robustness of financial institutions in a manner that is not detrimental to firm and eventually, economic growth.

We thus aim to provide further documentation of the transmission of deteriorating bank health onto their corporate customers. On the one hand, to attest the width of the impact on several firm outcomes, and on the other hand, to reveal the depth of the effects.
To uncover the aforementioned evidence we employ a quantitative exploratory deductive study of firms and their primary banks. The period to be studied is 2008-2013, which coincides with the unraveling of a global financial crisis and economic recovery, and in the environment on which we have access to the relevant data, Denmark. Thus leading us to our research question:

"How does bank health affect the firms that list them as primary bank in terms of capital structure and growth during 2008-2013 in Denmark?"

1.3 Methodology

The following section is aimed at giving an account of the assumptions and considerations underpinning this thesis and its research philosophy and strategy. Firstly, an assessment of what constitutes acceptable knowledge for this research will be made through epistemological considerations and ontology, which concerns the nature of reality as perceived by the researchers. Further on, the research approach will be described, as well as the techniques and data collection and analysis methods employed. The research philosophy adopted directs the selection process of primary and secondary data, as well as foundations for the arguments to be presented, analysis and the discussion of the results and implications.

1.3.1 Ontology and epistemology

The stance on objectivism/subjectivism comes from the assumption of phenomena analyzed with or without the researchers' values and views. (Saunders et al. 2009) As the investigation and the results of the research question is based on quantitative data and a statistical analysis of it, the reality of the relationship between banks and firms is independent of the social actors who live it. The conclusion and the discussion should be viewed as free of the views or values of the researchers, in terms of the axiology of the approach adopted.

With reference to the nominalism/realism distinction, in the context of this research, the social world external to individual cognition is a real world consisting of tangible and

relatively immutable structures, thus a realist objective position is adopted. (Burrell & Morgan 1982)

To define in the context of this thesis what acceptable knowledge is, it must be mentioned that the research philosophy adopted throughout is one that reflects the principles of positivism. Positivism reflects the philosophical stance of the natural scientist whose work is based on observable social reality and the end product may be law-like maxims comparable to those raised in natural sciences, reducing phenomena to simple elements. (Remenyi et al. 1998)

There are several approaches to the research process in terms of what the central role of observation may be. Whereas passive observation relies on evidence that already exists, observation of deliberate intervention is built on results from controlled experiments where the researcher may affect the change in the driving variable as well as what is being observed (Ibid.).

When the research involves observing the effects of a change in one or more dependent variables driven by an external change beyond the control of the researchers it is considered an uncontrolled intervention. Due to the nature of the events investigated in this thesis, the effects driving the observations are independent of the researchers, therefore will be observations of uncontrolled interventions.

This perspective will be reflected through the approach to the literature review in that identification and consideration of likely events that may be recognized as uncontrolled intervention and thus provide the focus for the research (Ibid.).

Through the hypotheses formulation and evidence collection design, the uncontrolled intervention approach will be shown through the intention of focusing the collection of evidence on the variables and issues that are most likely to be related to the cause and explain the impact of the uncontrolled intervention, in this case bank health development.

In the testing, analysis and discussion, the consequences of the change in the driving variable will be studied with the aim of a deeper understanding of a more specific aspect of a problem through multivariate statistical analysis which as well reflects the approach of the positivist uncontrolled intervention.

1.3.2 Methodological paradigm

The approach described as objective, realism and positivism uncontrolled intervention is epitomized in a nomothetic methodology. The nomothetic viewpoint is one grounded in methods employed in natural sciences which focus on testing hypotheses in accordance with the canons of scientific research. Surveys, questionnaires and standardized research are examples of the tools used in a nomothetic approach. (Burrell & Morgan 1982) And standardized research will be adopted in this thesis.

Another assumption about the nature of society which influences the research philosophy adopted is that of the sociology of regulation versus sociology of radical change. The sociology of regulation, which is the one pertaining to the research at hand, is concerned with the need for regulation in social affairs and rationalizing the forces at play to maintain society as an entity (Ibid.). Contradicting these social theories that emphasize regulation and stability is the sociology of radical change. Challenging the status quo and finding explanations for the structural conflict that characterizes society is how theories under the radical change sociology can be explained.

Therefore, the objective nomothetic characteristic of the research approach and fulfilling the sociology of regulation translate into a functionalist paradigm. This paradigm assumes that organizations are rational entities in which problems can be solved by solutions based on rational explanations and that is a strong assumption of the research of this paper.

1.3.3 Type of research and design

This thesis aims to understand the relationship between firms' health and their primary banks' health. To uncover the nature of the impact of bank health on firms denotes an exploratory pursuit. As such, this research is considered an exploratory study to assess bank health effects on firms' growth and capital structure in the context of banking regulation and transmission mechanism. The nature of the study implies that there is an inherent flexibility in the research in that the focus is initially broad and becomes progressively narrower as the research advances. That emphasizes the deductive approach to be taken, since the hypotheses to be tested will be uncovered during the research, in the assessment of the literature and existing theories.

The research design chosen in this thesis is that of a panel study. The data collection and subsequent analysis have characteristics of both a cross-sectional and longitudinal designs

which is what is what defines as a panel study (Bryman & Bell 2007).

The panel study confers the opportunity to examine specific variables and outcomes across all firms (cross-sectional) and throughout time (2008 to 2013).

The design adopted has similarities to a theory testing design only in how the theoretical framework gives rise to the concepts and conjectures to be studied in the empirical testing. That means that the research approach of this thesis is deductive, constructing hypotheses to be tested about the relationship between two or more concepts or variables. Deducing the hypothesis will stem from the theoretical conjectures developed from the study of the literature review and afterwards the hypotheses will be expressed in operational terms for the data and analysis at hand.

The fact that the hypotheses will be tested on data, means that the research is founded on an empirical approach. Therefore, as there are no overarching theories in the field of international banking regulation and transmission mechanism, most of the studies in the field are empirical and we cannot employ a theory testing design, but rather a deductive positivist panel study.

Our research will be structured as follows:

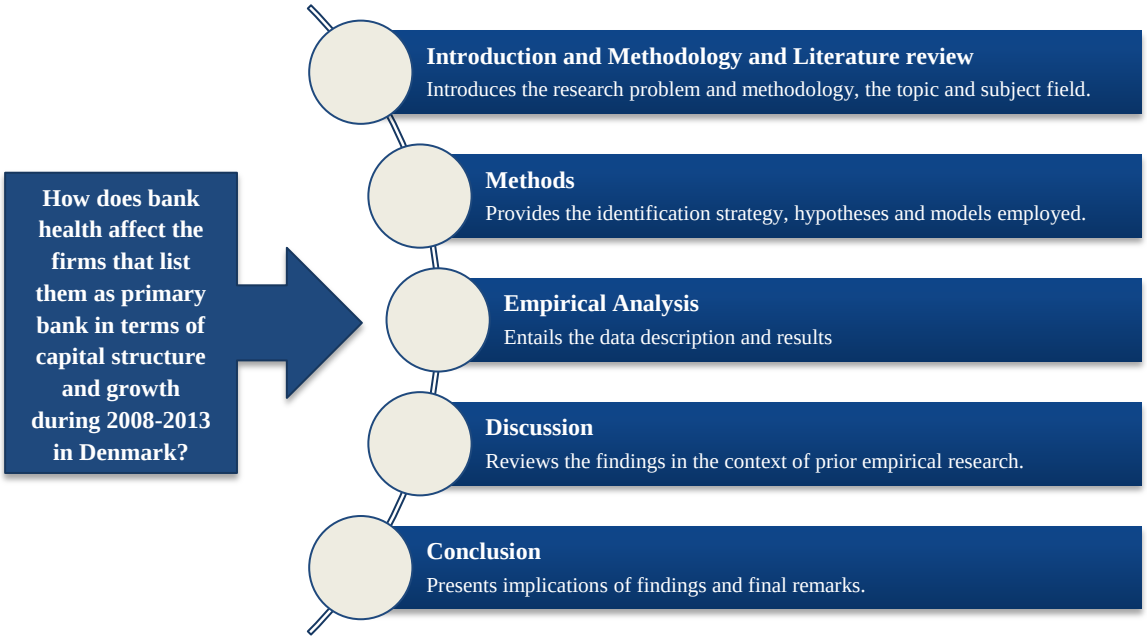


Figure 1. Structure of the thesis

1.3.4 Data collection and technique

In terms of the data collection and techniques to be used, the research will be founded on highly structured, large sample, quantitative data. The data used is based on companies' annual reports, documents and records gathered throughout 2003-2013 for 5,652 firms in Denmark. The data collection has been done by Experian A/S, an international data provider. In addition to the Experian data, primary data on specific financial information for the banks was obtained from the Supervisory Diamond for banks, within the Danish Financial Supervisory Authority.

The issue of credibility of research findings is a fundamental matter in any research design. Enhancing it has been attributed to two factors: reliability and validity. (Saunders et al. 2009) Reliability means that the data collection techniques and analysis procedures would yield consistent findings if repeated and validity refers to how well a test measures what it aims to measure.

With respect to the data collection technique, as that has been done by Experian A/S through its Center for Economics and Business Research department and it is perceived as a trustworthy source and its data consistent, the risks of any substantial errors or biases are highly unlikely yet accepted further on in terms of both validity and reliability.

For instance, in testing stability as a measure of reliability it would be necessary to reapply a measure to the firms and ensure that the observations do not vary across samples. Given the size of the dataset and the realistic constraints of time and accessibility to the information, testing of the stability will not be performed. That is a limitation of the research that is accepted and its impact on the results is not perceived as significant due to the high trustworthiness of the source of the data.

Furthermore, the nature of the data is information from annual reports as standardized accounting measures and firms are obliged to comply with reporting specifications. These are put forth by the International Financial Reporting Standards (IFRS) and regulated by tax authorities and external auditors in Denmark, therefore their internal reliability and consistency is assumed to be equitable for the purposes of this research.

As validity refers to whether an indicator that is meant to gauge a concept truly measures the said concept, it can be established through: face validity, concurrent validity, predictive validity, construct validity and convergent validity. (Bryman & Bell 2007)

Face validity is relevant for the use of the Z-score and the injunction variable as a measure of health for banks, where the effectiveness of the variables really measuring what can be understood as bank health is at question. To justify the motivation for their use, a detailed account of their advancement as well as criticism related to them will be made further on. Nonetheless, face validity can be established, according to Bryman and Bell (Ibid.), by confirming the soundness of the Z-score and the injunctions as a measure of bank health with experienced persons in the field which has been done by the researchers.

Concurrent and predictive validity refer to the tests performed and if they measure in accordance with widely accepted tests meant for the same purpose. But, as there are no stalwarts of tests or measures of bank health effects on firm growth, profitability or leverage, this type of validity does not bear high significance for the data analysis in this research.

Construct validity means if the deductions made from theory are relevant for the concept being examined. For this research, theory from reliable sources will be referenced in terms of peer reviewed academic papers and research but also international organizations of reputable prominence in the field of international finance and banking regulation such as the International Monetary Fund and the Danish Financial Supervisory Authority.

And the deductions to be made from this secondary research will follow a reasonable inference towards the topic being studied and will bear relevance to the research question.

Within construct validity, convergent validity must be considered. To delineate firm growth, capital structure and bank health we must consider the inter-relationships between these concepts but also their correlation with other constructs not considered. More explicitly, it can be very difficult to isolate the conceptual meaning of firm growth and capital structure as they may be highly correlated and when analyzing the effects of bank health on one the results obtained may hide the overlapping effects on the other. Even so, in financial analysis the different measures are regarded as explanatory for the aspect analyzed, i.e. Total assets for firm size and growth and for the purposes of the research they will be used similarly. However, for the purpose of validity of the results, the statistical analysis will aim to control for any significant inter-dependence and multicollinearity.

A compelling issue for the research at hand is the external validation, also known as generalizability, which refers to the extent to which the results obtained can be generalized outside the scope of this research. Based on the fact that the universe of the data obtained is Denmark, the expectation of country specific effects interplaying in the results cannot be

refuted. It is an assumption going forward that the sample of the firms in the dataset on which the analysis will be performed is representative of the population of firms and banks in Denmark, given that the selection process will be accounted for and motivated and follow reasonably logical assumptions. Moreover, the fact that the analysis is performed for the period of 2008-2013 might introduce certain period effects that may hinder the generalization of the relationship beyond this timeframe as different macroeconomic factors might interplay differently in this type of analysis.

Thus, the results obtained in this research are expected to be generalized with the considerations of the period and country specific effects at play.

1.3.5 Research strategy and methods

The methods employed will mainly involve quantitative methods and will follow the characteristics of a panel study. Qualitative analysis will be involved only to contextualize the theoretical background and to put in perspective the results obtained.

Quantitative research underpins the research philosophy adopted and the epistemological and ontological considerations that have been adopted as the appropriate methodology for this research.

There is criticism towards quantitative research which should be made clear and that must be considered when discussing the results of this research and its approach. The criticism pertains mainly to the denouncing of the role of social actors and their perception of reality and impact on social observations. Also, reproaching qualitative information and accepting facts as the knowledge is another criticism of the epistemology chosen. However, because this research aims to bring relevant knowledge in a field where data and objective reasoning prevail, its research philosophy and strategy are deemed relevant and the criticism accepted.

1.3.6 Scope and Limitations

The focus of this paper is the effect of bank health on firms during 2008-2013 in Denmark.
It is not the purpose of this research to make specific recommendations to policy makers, but to give an empirical based discussion on the implications of current and impending banking regulation, meant to ensure the health and stability of the financial sector.
The development of firms, regardless of the sector and what indicators of development are observed is impacted by the strategy of the firm. Be that as it may, this research assumes rational behavior on the part of the management in all firms to a great extent and rational

responses to exogenous factors such as regulation. Therefore an analysis of the strategy and business model at firm level will not be done.

The analysis of what determines bank health or the strategic and operational responses of banks when faced with a deterioration of their health is outside the scope of this paper.

What is more, the global macroeconomic environment plays an integrated role in the development of the business sector as well as the banking sector, but it will not be assessed in detail since it is assumed that the effects of the global financial crisis and other global macroeconomic trends are reflected in the data at hand sufficiently to answer the research question.

There are a myriad of limitations pertaining to this research in terms of hypothesis building, identification strategy and access to specific data. These will be discussed when they come into view in the research process in order to understand their context as well as their implications.

1.4 Literature Review

As the introduction identified the effects of the financial intermediaries' distress on their corporate customers within the context of financial shocks to the economy, we move towards reviewing the literature on the transmission mechanisms of these events to provide guidance on the areas of focus when attempting to analyze the aftermath of bank health on borrowers. Once these are identified the literature reviewes some of the specific distinguished effects of bank health onto its corporate borrowers. Seeing the importance of financial intermediaries in affecting the state of firms, there is an increased focus on regulation to control for the transmission of these effects, attempting to ensure a certain level of bank health, therefore this section will additionally provide an overview of the most eminent regulation and how the implementation of it affects the lenders and through the transmission channels, their borrowers.

1.4.1 Transmission Channels

The relevance for our research, of the different transmission channels, stems from the fact that the development of bank health will be disseminated through largely the same transmission mechanisms onto borrowing firms, and it will offer guidance on identifying the appropriate areas for analyzing these effects in the subsequent section of this report. Furthermore, research has shown that shocks to the economy or the financial sector can be amplified or attenuated by the health of financial intermediaries (Disyatat 2010), therefore, seeing that our research spans the period of during and following the 2008-2009 financial

crisis, it is paramount that we understand how these shocks are propagated in order to identify if the health of the bank does indeed cause an amplified or attenuated outcome onto the borrowing firms.

The Committee on Banking Supervision (2011) has identified three channels: *the borrower balance sheet channel, the bank balance sheet channel* and the *liquidity channel*, brought forth by the theoretical literature which offer an explanation for the transmission of shocks originating in the financial sector to the real economy and the amplification and retransmission, via the financial sector, of shocks originating in the real economy.

1.4.1.1 The Borrower Balance Sheet Channel

The borrower balance sheet channel stems from information asymmetries, more specifically the lenders inability to fully gauge the borrower's risks and solvency, fully monitor their investments and ensure the repayment of debt. Thus lenders will require collateral in order to extend credit which means that the borrower's equity position will affect its access to credit. There are two broad theories of borrower balance sheet models, one relating to the cost of financing and the other to the collateral required.

The cost of financing model researched by Bernanke & Gertler (1989) and Carlstrom & Fuerst (1997) identifies an *external finance premium* which pertains to the increased costs of financing a project externally as opposed to using internal funds and spread between the two is dependent on the creditworthiness of the borrower. This stems from the different incentives facing both parties. The borrower wishes to take on more risky projects and thereby increasing their return, while the lender wishes to limit the uncertainty of its repayment and thus the risk taking of the borrower. To align incentives the net worth of the borrower is included, such that, if the net worth were to fall, the borrower's cost of financing would increase. This implies that any shock that affects the net worth of the borrower, whether be it a financial sector shock that lowers asset prices or a shock to the aggregate demand that diminishes the firm's profits, will cause the cost of financing to rise for the borrower, further reducing the available funds for investments and increasing the impact of the original shock on the economy.

The second theory relates to the collateral required by lenders and it is researched by Kiyotaki & Moore (1997). The collateral is in place to protect lenders against the non-repayment of the debt, therefore any financial or real sector shock leading to a fall in asset prices will tighten the collateral constraint causing firms to lower production and spending and thus further propagate the shock to the economy.

However, Stiglitz & Weiss (1981) argued that higher collateral or the cost of funds will potentially attract riskier borrowers, as some of the more safe borrowers can no longer afford the credit, while the risky borrowers were already willing to pay a higher cost/collateral to obtain the credit due to their internal knowledge of the risks associated with the project. Thus the interest rate charged will affect the riskiness of the loan-adverse selection and the higher the rate, the greater the incentive to take on riskier projects. This is then not optimal for the lenders as an increase in the risk of the project they fund equates to a higher probability of not being repaid thus lowering the lender's profitability. Fig. 2 shows Stiglitz and Weiss theory that as interest rates increase the expected returns for the bank decreases and thus the optimal interest rate for the bank is not the one that clears the market in equilibrium. Thus lenders will not necessarily charge higher interest costs or collateral requirement, but will resolve to credit rationing. Credit rationing occurs in two types: when a borrower cannot borrow the full amount it desires and when between two identical borrowers, some will be able to borrow more than others.

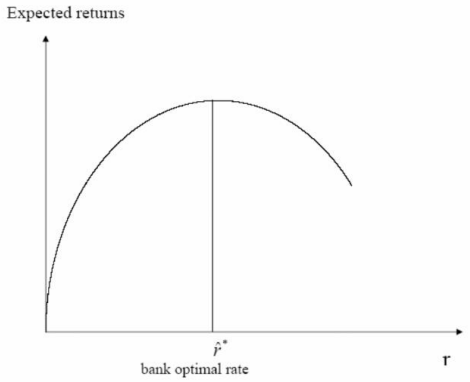


Figure 2 Bank Optimal Rate Stiglitz and Weiss

Shocks affecting the net worth of borrowers lead to an increase in agency costs primarily for low-net-worth firms. Borrowers facing higher agency costs should then receive a lower share of credit and thus be a greater part of the decline in economic activity. The reallocation of bank loan supply away from small firms and towards large firms referred to as the *flight to quality.* This has been researched by Oliner & Rudebusch (1996) with evidence that for small firms that face more severe informational asymmetries there is tighter association between internal funds and investments, which indicates a scarcity of external finance, while there is no observable effect on the larger firms. Furthermore, their research also proves a higher reliance on cash flow for investments for smaller firms. Lang & Nakamura (1995) and further contribute evidence to the existence of a flight to quality.

The Holmstrom & Tirole (1997) research allows for both intermediated credit (offered by banks) and non-intermediated credit (offered by investors) with the argument that credit offered by banks is more expensive as there is more monitoring conducted by the banks and thus the cost of financing increases accordingly. However, investors require higher collateral. Adverse shocks that affect the collateral, *collateral squeeze*, lead more borrowers

to seek credit at the bank thus increasing the funding costs, while some poorly capitalized borrowers will not be able to obtain credit at all.

1.4.1.2 The Bank Balance Sheet Channel

The bank balance sheet channel, as outlined by the Comitee on Banking Supervision (2011), entails that adverse shocks to the bank's balance sheet can cause sharp contractions in credit supply, which will lead to an effect on real economic activity. This occurs due to the inability of banks to fully insulate their supply of lending in response to such shocks and due to certain borrowers being highly dependent on banks for credit.

Evidence of the bank balance sheet channel, or under the more traditional definition *the bank lending channel*, comes as early as 1963 by Friedman (1963) who argue that the Great Depression's severity could have been greatly reduced if a more accommodative monetary policy would have been adopted. Further research has shown additional evidence on the effects of the bank's lending channel as a tighter monetary policy, which reduces a bank's reverves and reservable deposits causing banks to cut lending, leads to a shift in the firm's mix of external financing. The argument being that if the decline in loans is due to a general decline in credit demand associated with the slowdown of the economy then the demand of other types of credit should decline accordingly, however, research shows that there is simply a switch in the firm's mix of external financing and thus implying that it is the loan supply that is decreasing and not the loan demand (Kashyap et al. 1993). Moreover, Kashyap et al. (2000) found that the effect of monetary policy is even stronger for banks with less liquid balance sheets.

Ashcraft (2001), however, argues that some banks might be able to shield borrowers from these effects and the economic impact might be insignificant, which is particularly true for banks affiliated with multi-bank holding companies. Disyatat (2010) further strengthens that argument by providing a framework through which shocks can either be amplified or absorbed by the financial intermediaries, depending on the strength of their balance sheet and their risk perception, where stronger, less risky banks would be able to insulate the effects of the shocks from having an effect on borrowers.

For the bank-lending channel to be effective in transmitting the effects of shocks certain borrowers must be bank-dependent, entailing that at least for some borrowers nonbank sources of credit do not represent perfect substitutes to the bank loans and thus they will be impacted by the reduced supply of loans. This does not necessarily mean that these borrowers will be completely cut off from credit, but more that they will face significant

difficulties and costs in replacing the bank loans and thus curtail expenses and investments. As a result of these bank-dependent borrowers, investment and aggregate demand falls further then it would only through the traditional interest rate channel.

Evidence of bank-firm relationships stand as proof that to some degree there is such a thing as bank–dependent borrowers. Customer relationships arise between banks and firms as a consequence of information asymmetries. Sharpe (1990) argues that firms stay with the same bank because there are in a sense informationally captured and they will have a difficult time conveying information about their superior performance to other banks. Therefore, adverse selection will make it difficult for one bank to draw off another bank's good customers without attracting less desirable ones as well. Further research suggests that firms with close ties to banks should have a lower cost of capital and greater availability of funds relative to firms without such ties (Diamond 1984) as costs of monitoring are minimized and thus incentive problems between borrowers and lenders is minimized. Furthermore, Kellogg (1999) shows the benefit of relationship building in terms of firms being significantly less credit constrained. This applies also to other forms of financing, where if a firm has previously had long ties with a bank, the switching to a different kind of external financing will have an impact either on their cost of financing or on credit availability, thus amplifying the transmission effect. However, Ergungor (2005), argues that competition reduces these benefits of bank-borrower relationships, thus making relationship loans more risky and less profitable and thus lowering the viability of bank-dependent borrowers assumption.

The bank balance sheet channel expands the traditional bank- lending channel to also include the effects of changes in a bank's capital levels, which could arise for several reasons. These changes will in turn affect the supply of loans from that particular bank, which also reffered to as *the bank capital channel*. Holmstrom & Tirole (1997) model is based on bank lending being financed by capital, which gives an incentive for banks to monitor borrowers and overcome moral-hazard problems in the borrower's investment decisions. Therefore if a capital crunch occurs (just as with the collateral squeeze) this will lower the number of firms the bank can monitor and thus reduce credit to borrowers, with the most poorly capitalized borrowers being affected the most.

Furthermore, Stein (1998) researches banks' ability to raise funds with instruments other than insured deposits and finds that this will depend on the creditworthiness of the bank, which as in the borrower's balance sheet model discussed above will depend on the bank's capital. Therefore, the external finance premium is inversely related to the bank's capital as

the better capitalized the bank is the more incentive it has to monitor its borrowers and thus is able to pay a lower cost for their non-deposit funding. This cost is then transmitted onto the borrowers and thus lower capitalized banks can create higher funding costs for borrowers and thus affect the economic activity. Therefore any financial or real shock that affects the bank capital can have this effect on the borrower's expenditures and economic activity. This is shown by Van Den Heuvel (2007), who develops a dynamic model that incorporates the risk-based capital requirements and provides evidence that monetary policy effects on bank lending depend on the capital adequacy of the banking sector; lending by banks with low capital has a delayed effect and then amplified reaction to interest rate shocks, relative to well capitalized banks, while shocks to the bank profits, such as loan defaults can have a persistent impact on lending. Furthermore, financial sector shocks such as fluctuations in asset prices also affect banks' capital, thus the *bank capital channel* also transmits financial shocks to the real economy.

1.4.1.3 The Liquidity Channel

The liquidity channel as defined by the Committee on Banking Supervision (2011) report refers to the mechanism that given a liquidity or solvency shock, banks start to sell assets , which creates excess supply in asset markets and lowers asset prices. Falling asset prices lead in turn to further asset sales (as to meet resulting margin calls) which lead to a downward spiral in asset prices and balance sheet health. These were noted as early as Fisher (1933) who writes about the link between distress bank asset sales and bank health. Diamond, D. W., Dybvig (1983) also provide evidence on how this mechanism works, while Douglas W. Diamond (2005) notes that if depositors rush to demand payments (or are unwilling to roll over debt in the case of liability holders), banks can then be forced to sell profitable loans prematurely causing significant losses which will constrain future lending and in extreme cases drive contagious bank failures.

There are two types of liquidity: *funding liquidity* which is defined as the bank's ability to get funding immediately, either through asset sales or new borrowing, to meet repayments at maturity and *market liquidity* which is the ease of which an asset from the bank' balance sheet can be traded (Brunnermeier & Pedersen 2008). Diamond et al. (2009) argue that in the expectation of distress banks being forced to sell assets in the future at fire-sale prices, can drive even healthy banks to hoard liquid funds so that they can take advantage of the opportunities.

Further evidence on the existence of a liquidity channel is provided by Khwaja & Mian (2008), which investigate the impact of liquidity shocks caused by nuclear tests in Pakistan. Their research shows that a firm borrowing from a bank more affected by the liquidity squeeze will experience a decrease in their credit supply, especially for smaller firms, however that large firms with strong business or political ties completely compensate this loss by additional borrowing through the credit market.

Now that we have gone through the different transmission mechanism and their assumptions, we will turn our attention to a set of specific research on the transmission effect of bank health on different measures of firm's growth and capital structure.

1.4.2 Bank health and the real economic impact

This section is meant as a review of the current literature on the transmission effects of bank health on the performance of its borrowers and ultimately onto the economy. It will stand as inspiration in developing our own model.

A borrower often faces switching costs in dealing with individual banks, thus the financial health of any given bank might affect the borrower's cost of funds, particularly for firms that have close relationships with few banks. Under these premises, Fukuda et al. (2005) investigate whether the weakened financial conditions of banks have reduced the investment activities of small and medium firms in Japan and find that several measures of bank health: regulatory capital ratios, ratios of non-performing loans, stock prices and bank defaults have significant impact in investment by borrowers, even when observable characteristics of Tobin' Q, cashflow and leverage are controlled for. Furthermore, they argue that the regulatory capital ratios and ratios of nonperforming loans are backward-looking and only loosely related to a bank's economic value, however they seem to be the strongest influencers on a firm's investments.

Based on Fukuda et al. (2005) research, Ma et al. (2011) examines firm level data for Malaysian listed firms between 2000-2007 and aims to add additional empirical evidence by using an unbalanced panel data methodology. They found that core capital ratios and risk weighted capital-adequacy ratios show positive impact on firm investments, thus suggesting that when a bank health deteriorates and bank lending is tightened, this will negatively affect the investment of the firms.

To test the effects on borrowers' cost of funds Hubbard et al. (2002) use a matched sample of borrowers and banks to investigate the effect of bank's financial health, controlling for

borrower risk and information costs. They find that low-capital banks tend to charge higher loan rates than better capitalized banks, with a stronger effect for firms for which information costs are likely to be important and when borrowing from weak banks, these firms tend to hold more cash. They argue that these firms engage in a certain amount of "cash smoothing" to finance fixed investment, through the use of cash or working capital, in the absence of easily available bank credit. Such evidence is also presented by Fazzari & Petersen (1993), Calomiris et al. (1994), Hubbard (1997) and Ogawa (2013).

Chodorow-Reich (2013) investigates the effect of bank lending frictions on employment outcomes and found that firms that had pre-crisis relationships with less healthy banks had a lower chance of obtaining a loan following the Lehman bankruptcy, paid a higher interest rate if they did borrow and reduced employment by more relative to other firms. Lender's health had an economically and statistically significant effect on employment at small and medium firms with no effect on the largest or most transparent firms. To further build on this research Dwenger & Fossen (2015) research the transmission of bank distress to the real economy-in particular, to real investment and labor employment by non-financial firms in Germany and found significant evidence of reduced investment and employment at the firms that borrowed from lenders that experienced losses due to proprietary trading activities, with a stronger effect for firms that have less collateral to provide. Firms partly offset the reduced credit supply by establishing new bank relationships, using internal funds and issuing new equity.

Abildgren et al. (2011) study the effect of bank health on the probability of default of the borrowing firms, using large scale firm level data on Danish firms during 2008-2009. The authors classify the banks into weak and sound banks based on data just before the outbreak of the financial crisis and found that the probability of default was significantly higher for firms with a weak bank than for firms with a sound bank, however it found no distinguishable effect on the different firms' return on assets which may indicate the presence of heterogeneous effects of having a weak bank with significant effects on some firms but insignificant for others. The increase in bankruptcies as a result of bank health is further evidenced in the papers of Joeveer et al. (2004), Fukuda et al. (2009).

The literature above highlighted the central role the financial intermediaries play in the transmission of shocks and the effects of their own financial stability onto the borrowing firms' health. Moreover, it provides evidence that a better capitalized bank can contain to some degree the shocks experienced by lenders. Therefore, there has been an increased focus on regulation put in place to ensure the banks have the right incentive to monitor their

borrowers and diminish the effects of individual bank health and financial shocks onto the real economy. However, some research has questioned the importance of compliance with international regulation in relation to creating a more sound banking system. Demirgüç-Kunt & Detragiache (2009) after studying data for over 3000 banks in 86 countries argue that compliance with Basel Core Principles developed in 1997 is not associated with bank soundness.

The next section will present an overview of the current and future international regulation addressing the financial institutions.

1.4.3 International Regulatory Standards

The introduction of the capital measurement system in 1988 (Basel I) by the Basel Committee on banking Supervision, represented the first internationally accepted bank capital definition and divided bank capital into two elements: Tier 1 (core) capital made up from shareholder's equity and disclosed reserves and Tier 2 (supplemental capital) which comprises undisclosed reserves, revaluation reserves, hybrid instruments and subordinated debt. Furthermore, it set the minimum capital requirement of at least 8% of risk-weighted assets (RWA), (Basle 1988). However, the accord was criticized, among others, for the lack of risk sensitivity, awarding the same weight within one asset class (e.g. all corporate bond were given the same weight regardless of their credit rating) and for only focusing on credit risk.

In 2004 the new Basel II Accord for Revised Capital Framework was released (Committee on Banking Supervision 2006), and added the goal of promoting the adoption of more stringent practices in the risk management field which would drive regulation that relied more on internal data, practices and models. The three pillars presented in Fig. 3 reiterate the focus on minimum capital requirement, however adding market risk (liquidity risk) and operational risk (country and sovereign risks) within its computation, define a supervisory review in connection with the banks' risky-assets models and establish higher disclosure standards within the third pillar, Market discipline.

Figure 11: The three pillars of Basel II Accord

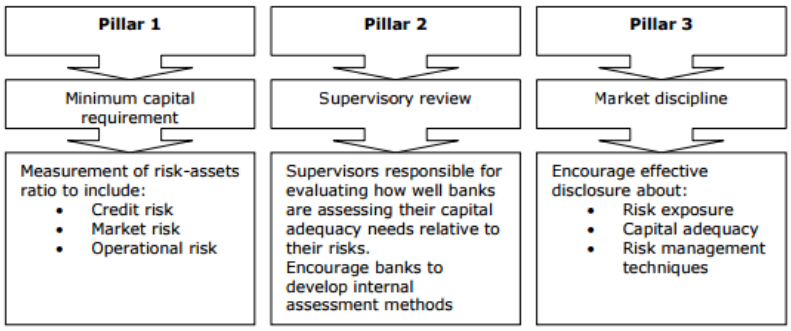


Figure 3 Basel II Pillars, Source: Casu et al. (2006)

The minimum capital requirement addresses the issue of how much equity a bank holds as a ratio of its liabilities. The individual weight for each asset class can be established either using the standardized approach in which Basel II outlines the weights based on an external credit assessment within each asset class or through an internal ratings based approach (IRB) where banks establish their own internal credit rating models to calculate the adequate capital needed to cover unexpected losses, subject to strict quantitative and qualitative standards. The IRB method was meant as an incentive for banks to increase their internal risk management practices. Pillar 2 was in place both to review if the requirements from Pillar 1 were respected but also to integrate the risks that were not incorporated into RWA such as reputation risk and strategic risk. To this end, the banks were expected to maintain a capital level above 8% of RWA in order to capture the effects of the additional risk sources. Pillar 3 then added an additional pressure from the market place for the bank to improve its risk management systems as the regulation introduced certain disclosure requirements that were previously considered confidential, and thus the market players could form a better understanding of the bank's soundness.

However, the effectiveness of Basel II was highly contested with literature extensively studying the pro-cyclicality effect of the imposed regulation. Research argues that the bank capital regulation has the potential to be pro-cyclical due to bank profits turning negative during recessions, lowering the bank's available capital and causing them to curtail lending. Furthermore the capital requirements through the IRB approach are an increasing function of bank's estimates of the probability of default and loss given default, both which increase during downturns causing higher capital requirement , leading to an even more severe contraction in the supply of credit (Repullo Rafael & Javier Suarez 2009).

Further studies have shown that the use of the different credit rating approaches also influences the effect of Basel II, where the use of "point-in-time" rating system could lead

to a sharper increase in capital requirements during recessions, further deepening the credit supply cut (Catarineu-Rebel et al. 2005). The point-in-time approach focuses more on the short term estimation of credit risks, therefore times of economic stress will cause short-term default probabilities of borrowers to rise.

Colliard (2012) points out the issue of allowing the banks to develop and use their own internal risk models as this may cause an overly optimistic model in order to bypass the tighter capital requirements and increase return on equity, creating a riskier bank.

Furthermore Basel Committee on Banking Supervision (2014) addresses the shortcomings of Basel II citing the "mechanic reliance on external ratings" and "insufficient risk sensitivity" as the two main weaknesses of the framework.

The drawbacks of Basel II framework has led to its revision into Basel II.5 and later into Basel III which is to be fully implemented by 2019.

The framework of Basel III, "A regulatory framework for more resilient banks and banking systems." (Committee on Banking Supervision 2010) was meant as a reform to strengthen global capital and liquidity rules and improve the bank's ability to withstand both internal and external shocks. Learning from the development of the financial crisis the committee aimed to enhance risk management and governance while also strengthening the transparency and disclosures of banks. Their initiatives are meant to address the excessive leveraging that had been built up in the banking sector and the insufficient liquidity held. The reforms are both at a micro and macroprudential level, meaning that improving individual bank resilience will lower the risk of system-wide shocks to the global banking system.

The Basel III framework is two-fold, it brings a strengthened global capital framework enhancing the provisions set out in Basel II but also introduces a global liquidity standard. The capital framework is concerned with the quality standards of the capital, two new buffers, a new leverage ratio, systemically important financial institutions' requirements and risk coverage.

Firstly, the quality of the capital base was intensified while total regulatory capital remains at 8% of risk-weighted assets at all times as in Basel II. Tier 1 Capital must be at least 6% of the 8% of total capital and must consist of Common Equity Tier 1 (CET1) at least 4.5% of risk-weighted assets leaving a maximum of 1.5% for Additional Tier 1 capital. The qualitative standards for both types of Tier 1 capital have been significantly increased, with

a greater focus on common equity and other instruments with similar loss-absorbing capabilities. Tier 2 Capital, as the gone-concern loss absorption capital must fulfill stricter requirements and its level overall reduced.

Secondly, in addition to the stricter requirements for the quality of capital, Basel III imposes a mandatory conservation buffer of up to 2.5% of risk-weighted assets consisting of CET1.

While the risk weighted capital requirements are increased up to 10.5% from 8% an additional measure to prevent build-up of excessive leverage is implemented in the new framework as a leverage ratio. As such, banks' Tier 1 capital must be at all-times at least 3% of total exposure defined as both on and off-balance sheet items. There are guiding principles on the measurement of both capital and exposure to ensure consistency and verifiability of the ratio in the supervisory review.

In addition to the conservation buffer, a countercyclical buffer is imposed in Basel III which is required by local regulatory authorities if they judge that there is a significant credit growth and accumulation of system-wide risks and it can be up to 2.5% of risk-weighted assets. This buffer is meant to address the procyclicality of Basel II and enhance the resilience of the individual banks and thus the entire sector.

Whereas procyclicality magnified the effects of the financial crisis over time, the excessive interconnectedness of the banking sector expanded its reach globally. An important role in that is held by global systemically important banks which, in the view of the Basel Committee, should have loss absorbing capacities beyond the minimum requirements to mitigate the impact of system-wide shocks. The additional loss absorbency requirement should be met with an increasing CET1 capital requirement of 1% up to 2.5% based on the systemic importance of the bank.

Enhancing risk coverage was a key lesson from the crisis when failure to capture on and off-balance sheet risks and derivative related exposures played a key role in destabilizing the banking system. Banks will need to strengthen capital treatment for securitisations and trading activities as well as the exposure to counterparty credit risk.

Beyond the capital requirements described above, Basel III comes to address the liquidity crunch ensued in the financial crisis. The reform standardizes global liquidity through a liquidity coverage ratio and a net stable funding ratio, but also establishes principles for supervisory monitoring of banks' liquidity. The liquidity coverage ratio requires banks to have enough high-quality liquid assets to withstand one month stressed funding scenario

and the net stable funding ratio is a longer-term structural measure providing incentives for banks to use stable sources of funding.

Even though Basel III is meant to overcome the weaknesses of Basel II, it faces similar criticism with respect to the over reliance on external rating agencies, the risk weighting system and ethical issues (Amediku 2011). Another criticism not ratified in this reform is the regulation of "promises" within shadow banking and its implications of distorting capital requirements (Blundell-Wignall & Atkinson 2010). The same authors argue that the leverage ratio may become a maximum capital ratio if set too high. And while increased capital and liquidity requirements are generally commended, it is expected to worsen economic development (Elliott 2010) and GDP growth by -0.05 to -0.15% per annum mainly because banks will pass on higher costs to their customers (Slovik & Cournède 2011).

The increased focus on regulation as well as the shocks that affected the financial system throughout the years has led to a constant improvement in the existing regulation in order to account for any factors, which might hinder the stability of the financial sector and cause financial shocks to be transmitted to the economy. The ramifications of this have been felt both within the financial sector as well as for non-financial firms as the aftermath of regulation itself crippled down into the real economy. To this end, there has been extensive research into whether or not higher capital requirement constitute a shock to the bank's funding structure and their cost of supplying credit. On the one side, researchers argue that the increase in capital requirements is meant to make a bank safer and thus a lower risk investment by shareholders, lowering the bank's cost of equity and leaving the credit supply unaltered (Amitti & Weinstein 2011, Kashyap & Stein 2010).

On the other side, increased capital requirements can lead to a boost in the incentive for lenders to monitor borrowers (Holmstrom & Tirole 1997) however, due to informational asymmetries the supply of credit might be reduced (Stiglitz &Weiss 1981, Agur 2013).

Brunnermeier & Pedersen (2008) argue that having more equity in the bank capital structure may lead to an increase in the bank's cost of funding due to liquidity considerations while DeAngelo & Stulz (2013) contend that the increase in the bank's cost of funding will stem from tax-advantages of debt and implicit government guarantees.

The transmission mechanism of increased capital requirements is presented in Fig.4 Where if a bank has excess capital on top of the required capital the effect of the increase in the minimum capital requirement will be absorbed within the excess capital and should not be

further transmitted in the economy. However, if the excess capital is not enough to offset the increase in requirements then the bank will have either the option to increase equity thus possibly raising the bank's funding costs and thus lowering the credit supply, or decreasing its assets which will also lead to a decrease in credit supply.

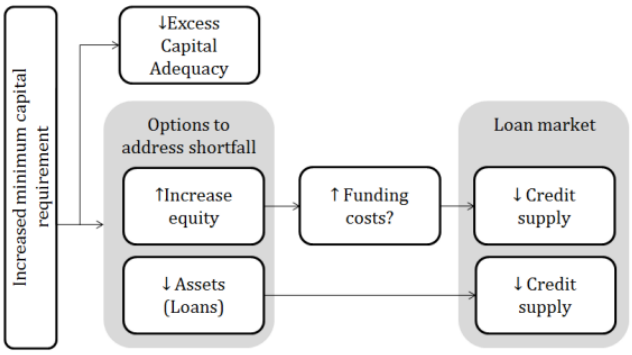


Figure 4 Increased capital requirements transmission, **Source: Jensen Laerkholm (2015)**

Jensen Lærkholm (2015) shows how increases in individual bank's capital requirements affect borrowing and growth at the firm level. His findings reflect that borrowings at firm level does decrease when the capital requirement is heightened, nonetheless the author found no significant effect on firm's asset growth as firms were able to substitute towards equity financing instead of reducing their balance sheets. However, young firms, with negative earnings were in fact impacted by the increased capital requirements to their primary bank.

1.5 Our contribution

Our first contribution to the strand of existing literature provides empirical evidence on the effect of bank health on the borrowing firms by applying a comprehensive research on firm outcomes, spanning firm capital structure and growth, using a unique dataset which pairs firms with their primary lender. Having access to firm level data allows us to account for potential borrower characteristics, which drive the outcome of interest and represents an advantage over analyzing the effect using aggregate lending data, which disregards the differences in banks' loan portfolio and individual borrowing firms' characteristics. These characteristics are selected based on prior empirical work onto the drivers of firm outcomes and are explicitly chosen for each specific outcome.

The outcomes studied take inspiration in prior literature and examine first the impact of bank health on firm's capital structure and cost of funding, allowing firms to compensate

for a potential reduction in credit supply through internal funds or equity. Investigation onto the effects on firm investments and growth are then undertaken.

To identify the causal relationship of bank health on firms we use a unique empirical opportunity related to the 2010 injunctions to certain Danish banks, granted by the Danish Financial Supervisory Authority, to increase their minimum capital requirement. These injunctions are thereupon used to classify unhealthy banks and respectively estimate the impact they might have had on borrowing firms' outcomes. To account for the years where no data is available on the injunctions we further supplement our research by estimating the bank's probability of default as a proxy for bank health and examine the impact of banks with higher probability of default, classified as unhealthy banks.

Our second contribution to existing literature stems from our advancement of research on the bank balance sheet channel. The bank balance sheet channel has been defined as a shock affecting the bank's balance sheet, which will have an effect on the cost and availability of credit. Traditionally the mechanisms of this channel have been studied through the transmission of monetary policy, as outlined within the literature review. Despite the fact that we do not specifically set out to prove the existence of such a channel our results demonstrate that regulatory actions which impact bank's balance sheet such as an increase in the minimum capital requirement, can and will have effects on borrowing firms, which will be carried out through the same transmission mechanisms as outlined in the bank balance sheet channel.

Bearing in mind that our empirical work is based on Danish firm-bank information pertaining to the 2008-2013 period, the next section will outline the factors contributing to the onset of the financial crisis in Denmark and its repercussion on both the banking sector and the economy in general to provide a context for the research to follow.

1.6 The Danish Financial Crisis and Regulatory Environment

In the years preceeding the global financial crisis, the Danish economy experienced increasing prosperity, GDP growth with rates from 0.4% up to 3.8% between 2001 and 2007. (World Bank) The relatively high and seemingly sustainable economic growth together with low and stable inflation and also low interest rates supported a widespread optimism towards future growth and an underestimation of risk. In terms of policy, Denmark had a pro-cyclical fiscal policy and its monetary policy can work only towards defending the fixed exchange rate policy so there were very few means to address an

overheated economy. Given that Denmark's economy is a small one, yet highly connected internationally both through trade flows and capital movements, it was quite exposed to external shocks from a global crisis (Jesper Rangvid 2013).

Denmark's exposure to the crisis came mainly through the financial sector, which as a result of a fundamental shift in financing in the years before 2008, was funding accumulating deposit deficits through international capital and money markets. When Lehman Brothers was filing for bankruptcy in September 2008 liquidity froze as international confidence between banks surged, and Danish banks had difficulties in refinancing their debt. Due to the increasing complexity of the financial system, it was significantly more difficult to assess the accumulation of systemic risks for banks in light of newer complex financial products and decreasing transparency in a system outside of the main banks, a so-called "shadow banking" sector (Ibid.).

To exemplify the precarious situation of the Danish banks in 2008, it is noteworthy to detail the regulatory environment underpinned by new International Financial Reporting Standards and capital adequacy requirements through Basel II which ended up reducing their capital cushion, increasing the leverage ratio and thus leaving the banks vulnerable to an exogenous shock. These standards set by the International Financial Reporting Standards (IFRS) meant that banks were required to reverse their provisions for bad debt giving them the opportunity to increase lending with the additional capital gained (Ibid.). This in addition to the procyclicality effect of Basel II, in which the probability of default involved in the calculation of the risk-weighted assets was underestimated in a booming economy, meant that the banks had reached a very weak position before the summer of 2008.

With respect to the national authorities and regulatory bodies, after a detailed analysis has been concluded, that both the Danish National Bank and the Danish Financial Supervisory Authority had underestimated the magnitude of the liquidity risk that the financial sector was exposed to as a result of increasing deposit deficits as well as the monitoring and management of the risk (Ibid.).

The dire effects of the financial crisis materialized when Roskilde Bank, the eighth largest bank in Denmark (Rigsrevisionen 2009) was facing sever financial distress from a sharp rise in loan impairments and collapsed. Loan impairments surged among many banks and closer inspection of the solvency requirements showed that several institutions were unable to continue operations.

For the financial sector, the ramifications of the crisis were significant. During 2008-2011 total write-downs amounted to DKK 147bn. 62 banks ceased operating between 2008 and 2013. And in greater terms, for the whole economy, there was a total cumulative production loss over 2008-2013 of about 12% of GDP, an equivalent of DKK 200bn. (Jesper Rangvid 2013).

The cumulative production loss accounted for the business sector is observed more in detail to account for the development of several key factors at a national level, factors which are included further on in the analysis of bank health on firm's capital structure and growth.

During 2008-2013 the business sector experienced a substantial growth in the seasonally adjusted bankruptcies, reaching a maximum level in 2010 for the past 36 years as seen in Fig. 5. The number of firm bankruptcies shows that the effects of the financial crisis were felt at the firm level quite drastically 2 years after the collapse of Roskilde bank.

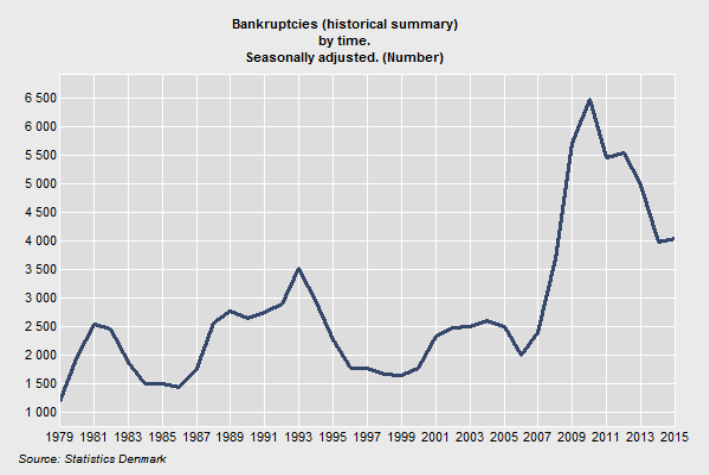


Figure 5 Firm bankruptcies
Source: Denmark Statistics

Another development of the crisis on Danish firms materialized in the reduction of the number of full-time employees by 8.5% from the beginning of 2008 to 2013 across all industries as seen in Fig.6. While there can be several underlying causes for firms resorting to layoffs, including lower demand or operational efficiencies, the transmission of the financial crisis onto firms directly through their main bank might have also played a role in the decision making of firms to reduce staff costs.

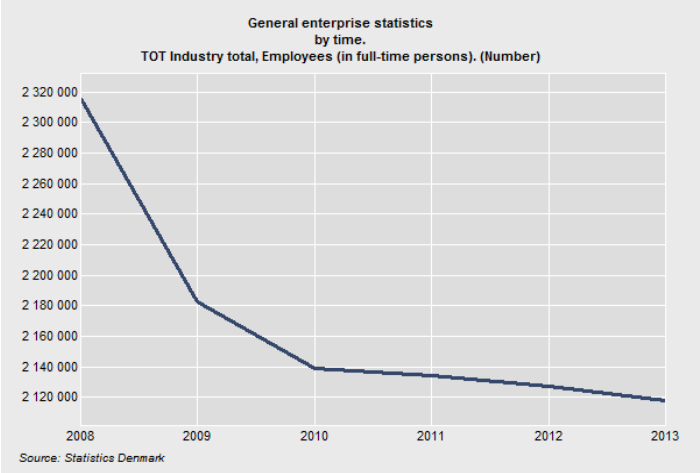


Figure 6 Number of employees
Source: Denmark Statistics

In terms of interest rates, it seems that the deposit and lending rates follow similar trends at an aggregated banking sector level from Fig.7. However, non-financial firms earn from deposits in Q1 2008 3.7% p.a. and they pay 6.1% p.a. for loans while in Q4 2013 is 0.3% p.a. and 3.8% p.a., so relative to their interest income, firms pay relatively more in interest expense. The overall trend over the period seems to reflect a decline in the level of interest rate.

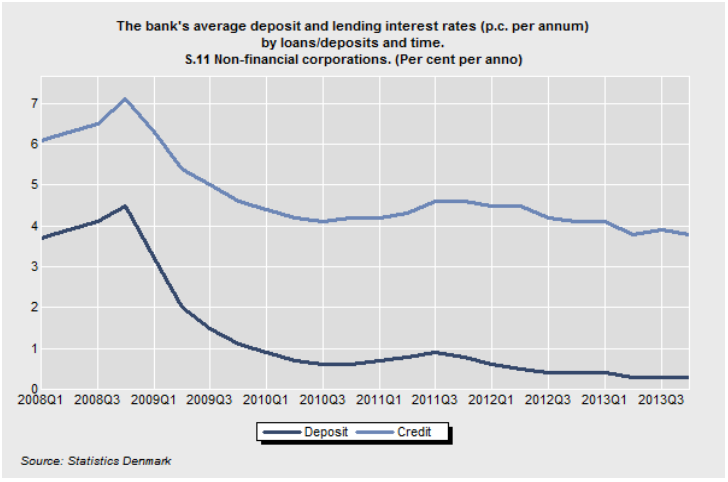


Figure 7 Bank average deposit and lending rates
Source: Denmark Statistics

At an aggregated level of the banking sector, total loans have decreased during 2008-2013 quite sharply as seen in Fig. 8. However, whether the financial crisis was a shock to the demand or to the supply of loans cannot be inferred.

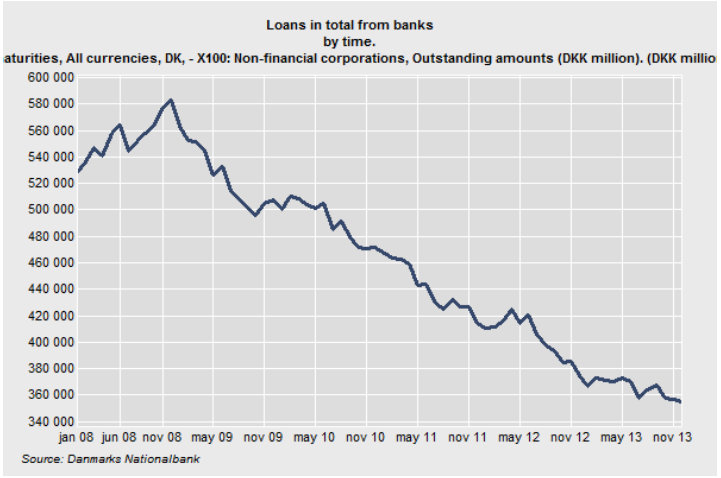


Figure 8 Total of bank loans
Source: Denmark Statistics

Going into more details on the credit condition of corporate lending for the same period we see the interplay of different factors in Fig. 9. The prices at which banks were willing to lend out increased from 2008 as did the collateral requirements for firms, showing that the ease of borrowing was substantially lowered during the period. Which brings another dimension to the corporate

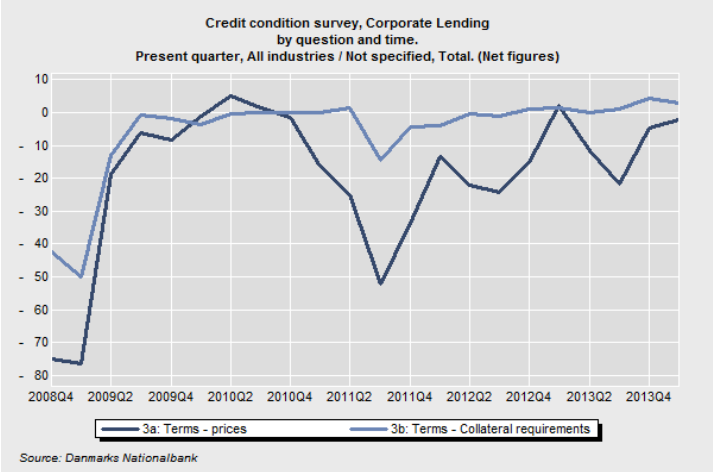


Figure 9 Credit condition for corporate lending
Source: Denmark Statistics

borrowing, thus not only was the amount of loans reduced, but the costs were raised and the collateral enhanced.

To put the debt level of firms into perspective, we can look at the development of firm investments during the crisis and before. Whereas in times of economic growth before 2008 firms were investing relatively more than what they were borrowing, starting in 2008 outstanding debt exceeds quarterly gross fixed investments, as seen in Fig. 10. However, during the crisis the investments were significantly lowered while debt levels rose suggesting that firms' operating and financial expenses required more capital and rendered the firms unable to invest.

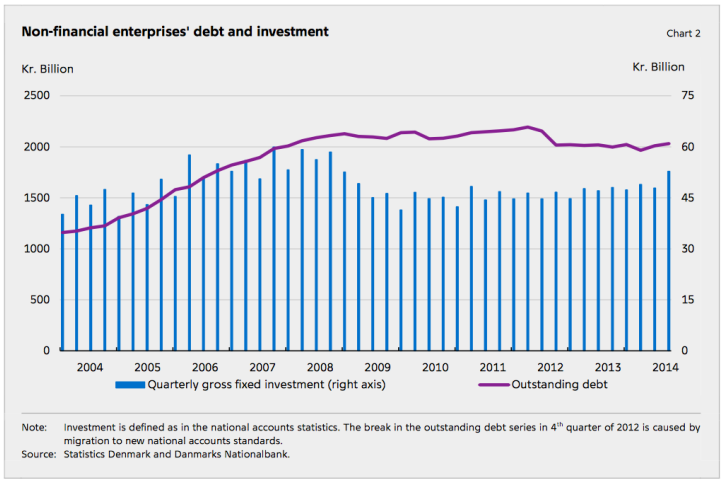


Figure 10 Non-financial enterprises debt and investments
Source: Kuchler 2015

While these were the developments in the private sector, to get a better understanding of how the financial crisis unfolded in Denmark it is imperative to account for the government's involvement as its actions were instrumental in the efforts to restore financial stability to the country's economy and the robustness of the financial sector.

The government reacted swiftly and decisive to the events of summer 2008 and created an unlimited government guarantee 'Bank Package I' to restore stability in the financial sector by giving them access to the gravely needed funding in light of the liquidity freeze. A state-owned winding-up company was established, 'Finansiel Stabilitet A/S' also referred to as FSC, to cover the guarantees and take over distressed financial institutions that were not able to fulfill their minimum capital requirements and wind them up (International Monetary Fund 2014).

While the first package, 'The Stability Package', established a state guarantee of losses up to DKK 35 bn. it also saw the takeover of 7 banks by the FSC. Those banks were: EBH Bank, Løkken Sparekasse, Gudme Raaschou Bank, Fionia Bank, Capinordic Bank, Eik Banki, Eik Bank Danmark.

Impairment losses on loans, advances and mortgage deeds were the underlying drivers of distress in EBH Bank. For Fionia Bank, Løkken Sparekasse and Gudme Raaschou Bank

solvency fell short after impairment write-downs on loans to property development companies and others. Capinordic Bank, Eik Banki, Eik Bank Danmark failed to comply with the solvency requirements (Danmarks Nationalbank 2009).

Bank Package II, 'The Credit Package', established provisions for state guarantees to supplement the support enabled in 2008 as it become apparent already by 2009 that the initial guarantees were not sufficient and the initial maturity of the loans had to be extended by 3 years.

Under Bank Package III, 'The Exit Package', Amagerbanken and Fjord Bank Mors were taken over by the FSC, and the government did not extend guarantees, attempting a return to normality in the market in which the financial sector would cover the losses of any distressed institutions through a depositor guarantee scheme. Amagerbanken had a substantial exposure to the property sector and following loan impairments could not meet the solvency requirements and it was taken over by the FSC and its senior creditors had to bear part of the losses (Finanstilsynet 2011). Fjord Bank Mors could not fulfill increased solvency requirements after impairment write-downs and had to be taken over by the FSC as well (Finanstilsynet 2016).

Bank Package IV 'The Consolidation Package' was aimed at supporting and strengthening the conditions for consolidation among financial institutions to reduce the FSC's involvement with distressed banks and support others to take-over the healthy assets of banks in difficulties. Max Bank and Sparekassen Østjylland were the banks taken over under this package during 2011-2012. The conditions of this package differed from the previous guarantees in that no unsecured creditors incurred any losses due to guarantees put forth by the Danish state and the Guarantee fund (Danmarks Nationalbank 2011). Danish banks were required to contribute to the Guarantee fund.

And Bank Package V 'The Development Package' had a goal to bolster growth and export financing with particular initiatives towards the agricultural sector. A property portfolio of FIH Erhvervsbank A/S was taken over by FSC as part of the package.

In 2013 the government introduced more rigorous and strict solvency and liquidity requirements for systemically important banks (SIFI) and mortgage credit institutions through Bank Package VI (International Monetary Fund 2014).

Practically, the last of the bank packages instates many of the Basel III amendments in terms of both the capital requirements for all banks and additional buffers for systemically

important financial institutions (SIFI) and the liquidity requirements. The banks defined as SIFI as of 2013 were: Danske Bank, Nykredit, Nordea Bank Danmark, Jyske Bank, BRFkredit and Sydbank which account for 87.6% of total lending and 73.5% of total deposits.

The takeovers of distressed banks during 2008-2012 and an investigation into the actions of the FSA regarding supervision and monitoring of Roskilde Bank uncovered the need for a more proactive approach on monitoring the exposure of the banks towards systemic risks and the sustainability of their business models. (Rigsrevisionen 2009)

Part of the development in the national banking regulation was the introduction of the 'Supervisory Diamond' for banks, which became effective in 2012 and is intended to document a number of special areas believed to be associated with high risk banks with the aim of monitoring that the banks stay within the stated limits for 5 key ratios.

However, Denmark is part of the European Union and as such, mainly abides by the regulation set forth by EU institutions. The European Banking Authority (EBA) has an important role in implementing the Basel III framework into the EU legislative process.

In 2013 EBA proposed a Capital Requirements Regulation (CRR) and a Capital Requirements Directive IV (CRD IV). The CRR is directly applicable to member states and it contains detailed prudential requirements for credit institutions and investment firms and the CRD IV must be transposed into national law taking into account the specificity of the respective national environment. (European Banking Authority)

Therefore, it is worthwhile to note that Denmark's banking sector regulation before and after the crisis followed the international frameworks Basel II and Basel III.

And to enforce the relevance of Denmark's banking sector as a case study in the context of international banking regulation it is noteworthy to accentuate its role in the global economy.

Starting from 2010 the IMF has been classifying "countries with systemically important financial sectors as systemic countries which could have a considerable impact on global financial stability" and in 2014 added 4 more, including Denmark, to the networks' 25 members. (Danmarks Nationalbank 2014) Denmark is part of the bank network with a strong participation in the claims network, meaning that many international banks have claims on Danish banks and vice versa. A potential crisis in the Danish financial sector is expected to have significant ramifications on the other Nordic countries, United Kingdom

and Germany and extend further onwards. This comes to support the theory that the financial crisis in Denmark was caused by an international liquidity freeze that rendered Danish banks unable to get funding and their strong dependency on the bank network forced the banks to seek government support.

Now that we have set the scene in terms of the methodology, the topic and the subject field within the relevant literature and the regulatory and national environment, we move to the methods employed to answer our research question.

2. Methods

This section addresses the identification strategy underlying our research in terms of bank health, the hypotheses built around the firm outcomes under capital structure and growth and finally, the construction of the chosen specification.

2.1 Defining Bank Health and Identification Strategy

The main identification challenge lies in simultaneously estimating bank lending channel and borrower channel and correctly identifying the effects, which pertains to the bank-lending channel. Having a dataset that pairs firms to their primary lender and which offers financial information on both the bank and the borrowing firm is a first step in trying to untangle the different channels' effects. However, solely pairing bank health to the financial outcome of the borrowing firm is not enough to identify the causal relationship of lenders onto firms. This is due to the reverse causality, or the inability to state whether bank health causes the changes in firm capital structure and growth or firm's own decisions with regards to capital structure and growth will ultimately determine the health of the bank. The way to tackle the reverse causality issue in literature has been to study the effects on firms of an exogenous shock to lenders (Peek & Rosengren 2000, Khwaja & Mian 2008, Amiti & Weinstein 2011, Chodorow-Reich 2013). Studying an exogenous shock to lenders allows us to establish a causal link between the health of banks and their borrowers, as the shock would be transmitted through the bank's lending channel onto the borrowing firms. This leads us to our first identification strategy:

2.1.1 2010 Bank Injunctions

The Basel II framework offered the option to banks to use their internal models to estimate the minimum capital requirement needed to cover their risky assets. The second pillar of the framework then ensured a supervisory authority would be obligated to review and evaluate the bank's internal models' adequacy. If the supervisory authorities deem the models inadequate, they can issue an injunction for the bank to change its methodology for calculating their minimum required capital level and thus drive an increase in the bank's minimum capital ratio.

The supervisory authority in Denmark is the FSA, who is tasked with ensuring compliance with banking regulations and routinely carries out bank examinations of individual banks to assess whether the minimum capital requirement is enough to comply with regulation and cover the risk attached to the bank's assets. The FSA had 123 banks under its supervision during the period 2010-2011 and carried out 40 banks examinations. Out of these 40 bank examinations a portion of them resulted in injunctions to banks to increase their minimum capital requirement. Our dataset contains 8 banks that received an injunction in 2010, with the information being sourced from Jensen Lærkholm (2015) where he looks at 21 bank examinations out of which 11 banks received an injunction.

Our identification strategy pertains to isolating the effects of the 2010 bank injunctions on the borrowing firms, by analyzing the period 2010-2012 for changes in the dependent variables caused by the injunctions while controlling for bank and firm characteristics.

Because the injunctions reflect a higher risk bank due to its insufficient core capital to cover its potential losses from its risky assets we view the injunctions as defining a weak bank that is forced by the FSA to implement measures to increase their financial health. *Thus the injunctions will represent a proxy for the health of the bank within our estimated models.*

The injunctions represent a unique empirical opportunity to uncover the link between bank health and borrowing firms as it represents an exogenous shock to certain banks, which takes effect primarily on the bank's balance sheet and does not directly affect the borrowing firms. This type of shock makes it easier to identify the source of the effect as pertaining to the bank and thus removes the reverse causality concern. If the bank received an injunction and it doesn't have enough excess capital to cover the required increase in core capital, it will eventually resort to credit rationing, as we have seen within the literature review. If borrowers are unable to fully substitute the decrease in credit supply from their primary

lender, either from other forms of financing or other banks which have not received an injunction, the cut in credit supply will lead to effects being seen in the firm's capital structure and growth.

However, before we make any inference as to the causal effect of the injunctions on firms we must address the concern of injunctions being truly exogenous to borrowing firms. The FSA states that a bank "examination is carried out on average every 3-4 years with larger banks and higher risk banks being visited more often". This entails that the injunctions are exogenous to firms but are not randomly assigned to banks, which may lead to doubts whether firms that borrow from the injunctions banks are different along an unobserved dimension compared to firms, which borrow from non-injunction banks. For example, firms from an injunction group may have more or less leverage than firms from a non-injunction group and may grow at a different rate than the non-injunction group firms. If this is the case, the results of our models will not only reflect the effect of the bank injunction on the firm but will reflect these systematic differences between the injunction and non-injunction group of borrowing firms.

To control for these differences we include a broad range of control variables following the research of Jensen Lærkholm (2015), Abildgren et al. (2011), Hubbard et al. (2002) who argue this is a reasonable strategy for attaining unbiased estimates of the effects of bank health. These control variables are further explained below. We further check that the firms prior to the injunctions were balanced between the two groups for the observable characteristics within our data description section and find that this is indeed the case. However because we do not impose limitations on firms being observed throughout the whole period of interest firms before the injunctions might have dropped out of the sample while others might have entered, thus the balance between the two groups is not necessarily maintained after 2010. However, the inclusion of firm specific control variables will account for these potential differences and isolate the effect of the injunction of borrowing firms.

The chosen period within our identification strategy stems from the fact that the injunctions were received in 2010 and thus they should not have an effect before that year. We extend the period to cover 2011 and 2012 in order to account for the potential delayed effect for the firm dependent variable. This potential delay will be examined in turn for each dependent variable, as they may not all necessarily experience the impact at the same time. Previous research on bank injunctions (Jensen Lærkholm 2015) has chosen to focus on a "before and after" treatment effect and only include firms for which data is available throughout 2009-

2011, however, we would argue that if we were to implement that methodology, we would be suffering from survivorship bias as firms that drop out of our dataset throughout this period may have been the most affected by the injunctions and their effect would be excluded. Furthermore, firms for which we only have data from 2010 onwards, but which report an injunction bank as their primary bank, may still experience the effect of the injunction even though they were not customers of that particular bank in 2009. Within the data description part we examine if effect may be diminished if we only include firms which report throughout the whole 2009-2011 period and uncover that there is no observable deviation in leverage means for firms reporting throughout this period while the whole sample shows a significant deviation after 2010 between the two groups of firm, confirming our strategy to include 2010-2012 data.

A further concern pertaining to the non-randomness of bank examinations and injunction is that the FSA analyzes and selects unhealthy banks to examine and impose injunctions. Examining the correlation between the FSA Supervisory Diamond variables and the Injunction variable is a way to tackle this concern. Fig 11 below shows that the correlations are quite low and thus should not give cause for concern, enabling us to assume that the FSA does not base its examinations and injunctions on prior measurement of bank health and risk.

	Injunction	Large Exposures	Excess Coverage Ratio	Impairment Ratio	Loan Growth
Injunction	1,0000				
Large Exposures	0,0073	1,0000			
Excess Coverage Ratio	-0,1425	-0,1820	1,0000		
Impairment Ratio	-0,0550	0,0805	0,3721	1,0000	
Loan Growth	0,0831	-0,1963	0,1308	-0,4019	1,0000

Figure 11 Correlation of injunction and FSA variables, **own creation**

Limitations to this identification strategy pertain to the fact that banks may anticipate an injunction and raise their required capital before the examination causing the effect after the injunctions to be underestimated.

A further limitation to this strategy is that we do not account for injunctions that might have happened prior or after 2010, due to our inability to source the information for any other years than 2010. This may cause part of the firms we classify as non-injunction to actually pertain to an injunction bank during the years 2011 or 2012 and thus may cause bias in our injunction variable. Furthermore, banks which did not receive an examination and thus an injunction may be wrongly classified as healthy banks.

2.1.2 Bank Probability of Default

To account for our inability to sources information about injunctions that might have happened in other years within our dataset, we supplement our method of analyzing bank health with an additional measure based on the estimation of bank probability of default using financial ratios. This measure would then offer us the ability to examine effects of bank soundness in all the years contained within our dataset and not only post the 2010 injunctions. It will further offer an estimate of bank health throughout a continuum of unhealthy-healthy banks where we can identify different degrees of bank health within the previous group of unhealthy or healthy banks as well as within the group of banks, which did not receive an examination.

To this end, our second identification strategy isolates bank health effects on borrowing firms by estimating the effects of bank's probability of default during 2008-2013.

To gauge the probability of default of a bank within this identification strategy, we turn to Altman (1968) who is the classical researcher of financial distress and bankruptcy. The formula developed by Altman in 1968 and further refined throughout the following years for different types of firms, has been shown to predict firm bankruptcy within two years. Based on a set of five financial ratios, it was initially developed for publicly traded manufacturing companies, but re-estimated based on other databases for private, manufacturing, non-manufacturing and service industries. As we are addressing bank health under a proxy for bank probability of default we estimate Altman Z-score model based on Altman (1968,1983,1993) for non-manufacturing private industries.

Z-score: $Z= 6.56X1+3.26X2+6.72X3+1.05X4$,

Where,

X1 is the Working Capital/Total Assets as a measure of the liquidity of the firm standardized by the size of firm,

X2 is Retained Earnings/Total Assets and it captures the cumulative profitability of the firm since inception,

X3 is Earnings before Interest and Taxes / Total Assets and measures the productivity of the assets or the earning power and

X4 is the Book Value of Equity/Book value of Total Liabilities.

If the Z-score is under 1.1 the bank is considered bankrupt, while if the Z-score is above 2.6 then the lender is non-bankrupt. The grey zone lies between the values of 1.1-2.6.

As the Z-score gauges the risk of a bank becoming bankrupt and thus its creditworthiness, it can serve as a proxy for estimating the health of lenders. Therefore, banks with a higher Z-score will be considered healthier (and further from default) than banks with lower Z-scores, providing us with a measure of bank health, which is estimated each year.

Our choice of Altman Z-score stems from the research provided by Mo Vaziri et al. (2012), who test the signaling ability of different methods in predicting financial intermediaries' bankruptcy beforehand. The authors apply Moody's financial ratios, Standard and Poor's financial ratios, Vaziri's financial ratios and Altman's Z-score and find that out of all models, the Z-score gives the best prediction of failed banks up to 80% correct, while it shows 75% correct prediction before two years.

The main assumption, to be able to implement this identification strategy, is that, conditional on firm characteristics, the firm's capital structure decisions and growth are independent of their decision of whether they borrow from an unhealthy or a healthy bank. This assumption is in place to ensure that weaker firms do not generally tend to borrow from weaker banks. To ensure this assumption holds, following the research of Abildgren et al. (2011), Hubbard et al. (2002), we employ a series of firm and bank characteristics meant to control for all variables, which simultaneously influences a firm's choice of bank and outcome variables.

However, the main concern with this strategy is related to isolating the effect of bank health on the borrowing firms. Reverse causality becomes a risk as the bank's probability of default may be driven by borrowing firms' deteriorating health, thus causing concerns whether firm capital structure and growth may be driving the bank's probability of default measure and not the other way around. To tackle this concern we employ a timing difference between the measurement of bank health and the firm outcome variable, following the research of Abildgren et al. (2011) such that the bank probability of default would be entered with a lag. Having a lagged measure of bank health diminishes the concern that the dependent variables are causing the bank's probability of default. As we do not know the extent to which the effect of bank probability of default can be seen on borrowing firms growth and capital structure decisions, we will employ a one period and two periods lag throughout the models as different dependent variables may experience the effect of bank health to different magnitudes throughout the alternate timing differences.

Another concern pertaining to this strategy refers to the fact that while some banks may have a higher probability of default, they may not all be necessarily focused on decreasing that probability as they may still be profitable and incentives may not be present to increase their health. To tackle this concern, we analyze the period during and after the financial crisis. As outlined in the section detailing the 2008-2009 Danish financial crises, the collapse of Lehman Brothers and the following liquidity freeze represented a liquidity shock to banks in Denmark. As the banks became increasingly reliant on deposits deficits and international market funding, when international confidence between banks surged, Danish banks had difficulties refinancing their debt. Studies have shown the presence of a liquidity channel, where banks affected by the liquidity squeeze will decrease their credit supply **(**Khwaja & Mian 2008). The liquidity freeze and the onset of the financial crisis has brought an overall worsening in health of the financial sector, with measures taken to restore financial health being common throughout the sector. However, banks with a higher probability of default would need to resort to more significant measures to restore soundness, thus having a more pronounced effect on borrowing firms (Judge & Korzhenitskaya 2012, Mitto U.R. 2008 and Leary 2009). The period is imperative to be noted as if we were to study the effect of bank health prior to the crisis we might have found the reverse effect on firm dependent variables. Studies have shown that prior to banking sector shocks, firms whose bank is less healthy have a higher degree of financial leverage (Yamada 2013) pertaining to a larger degree of over lending by poor-health banks compared to more healthy banks.

Limitations to this strategy reflect the lack of a clear identification of bank health effects onto borrowing firms, as it is not delimited by a certain event pertaining solely to banks that would then drive actions which would be seen on the borrowing firms, as in the case of the injunctions, thus making it harder to identify a clear effect pertaining to the Z-score. Further limitations concern the measure itself, as based solely on accounting ratios, it may fail to fully grasp the complexity of analyzing bank health, such as the use of off-balance sheet items. As the model was initially developed for manufacturing firms and later adapted for service companies, it has not been specifically adapted for financial institutions, thus perhaps not fully grasping the uniqueness of the sector. Furthermore, it entails sole focus on historical figures, which may not fully represent the current or potential future development of a bank, nor account for potential macroeconomic or regulatory pressures it may face. In this respect, the injunction measure provides an account for multiple risks facing the banks as the supervisory authorities account for multiple scenarios in their stress testing of a bank before issuing an injunction, providing a more complete classification of unhealthy banks.

Additionally, in the contexts of more sophisticated risk measurements and complex business models the Z-score may not be a measure that banks pursue to optimize when establishing their own stability and soundness and thus may not neccesarily seek to improve it if it indeed indicates towards bank health deterioration. Thus we may face a situation where a bank exhibits a deteriorating Z-score, however due to the lack of focus on the measure, the banks may not be resorting to any measures to seek to improve their score, such as a cut in their credit supply. Under these conditions, the Z-score measure's ability to identify effect on firm outcome will be diminished. Furthermore, certain ratios included in the computation of the measure may not be as relevant for establishing bank soundness as they would be for manufacturing firms, such as the working capital ratio, which is not a measure banks neccesarily pursue to improve.

Having the Z-score measure allows us to classify bank health along a continuum of healthy/unhealthy banks, while analyzing its effects on firm outcomes. To this extent, the measure becomes more sensitive to variation in a bank's health and might have a more difficult time capturing a significant effect on firm outcomes.

While we are aware of the Z-score limitations as a measure of bank health we argue that its pursuit as an alternative measure of bank health is still warranted, in the event that it may still capture the impact of bank health in the years where no injunction data is available.

Limitations to both our identification strategies pertain to the fact that we are only looking at a firm's primary bank, while studying the effect on firm's total leverage and growth, effect which may be diminished by the firm's ability to borrow from secondary lenders which are healthier and supplement with other forms of financing which we do not account for.

2.1.3 Control variables

The control variables employed in both our identification strategies are as follows:

Firm characteristics include firm size, age, probability of default, cash flow among others and will be specific for each model, based on previous research on what drives the dependent variable. The variables and their expected sign will be outlined under each hypothesis, within the following sections.

Bank control variables used, follow the FSA's Supervisory Diamond introduced in 2010 and represent the control variables previously employed by literature (Jensen Lærkholm

2015, Abildgren et al. 2011) The Supervisory Diamond includes five measures (Finanstilsynet n.d.), which indicate banking activities that the FSA characterize to be associated with high-risk banks. The limit values on each variable were set as to counteract excessive risk-taking and allow for resilient banks to perform profitable activities. The five measures consist of the following:

Excess liquidity coverage: is a measure of the excess coverage after the fulfillment of the statutory minimum liquidity requirements and is calculated as a percentage of the liquidity requirement. FSA maintains that this measure should be above 50%.

Lending Growth: represents the growth in loans for the period over total loans at the beginning of the period and is set to be below 20% according to the FSA.

Sum of Large Exposures: large exposures are defined as the sum of assets and off-balance-sheet items that, after a reduction for secured exposures, exceeds 10% of the combined Core capital and supplementary capital. It is stated as a percentage of core capital and should be below 125% according to the FSA limits, as insufficient management of large exposures has been one of the main reasons for banks getting into financial distress.

Commercial property exposure: is defined as the percentage of total loans and guarantee debtors within the "property administration and trading and business services' sector". The concentration in exposure related to this measure has caused difficulties for many banks once the property prices started falling. The limit value is set at below 25%. However, due to the fact that the Supervisory Diamond was only implemented in 2010, information regarding bank's commercial property exposure is not measured until 2010. Thus, we use as a proxy for the bank's commercial property exposure the annual impairment ratio as the commercial property segment experienced large write-offs in the aftermath of the financial crisis.

The Supervisory Diamond contains a fifth measure: the funding ratio, which measures loans/deposits, however we have not been able to find a substitute for the measure and it will thus not be included within our analysis.

Another bank control measure frequently used by literature is bank size, with bank total assets as proxy. We will, however not include this within our models as the injunction variable is highly correlated with bank size, especially throughout 2010, which further reinforces the FSA statement that examinations occur predominately at larger, more risky banks. In terms of the Z-score as proxy for bank health, bank total assets is included within

the calculation of the different ratios, taking into account bank's size within its probability of default, thus no further control for size is needed.

Having set out our identification strategies we now turn to building our hypotheses and expectations based on prior empirical work.

2.2 Hypotheses

Our hypotheses are built on previous empirical research on the effects of bank health on borrowing firms, conditional on firm characteristics and controlling for bank risk. While the controls for bank risk remain the same throughout each hypothesis, firm characteristics are derived from previous research on what drives each dependent variable. Thus the following section contains both our hypothesis in terms of the expected relationship between bank health and dependent variable but also arguments for including the specific firm characteristics and their expected relationship to the examined dependent variable. To help visualize the different variables included within each hypothesis, we develop a rough outline of the models we will specify, with bank health remaining to be developed further within the model specification section. We argue that introducing the rough estimation of each model within this section offers readers a better overview of the variables, conditional on which, we expect to identify specific bank health relationship to borrowing firm's growth and capital structure.

The next section will be divided into firm's capital structure decisions and firm growth, wherein each hypothesis pertaining to each subsection will be outlined.

Following previous research (Jensen Lærkholm 2015, Abildgren et al. 2011) we include firm's industry, region and legal form effects within all of our models, as to control for potential discrepancies in dependent variables among the different groups of firms pertaining to each category.

2.2.1 Firm Capital Structure

The capital structure represents the firm funding pool through which it finances its overall operations and growth and consists of the company's long and short term debt, common equity, preferred stock and retained earnings.

Before we develop our hypotheses, we uncover the firm characteristics that drive firm capital structure decisions, based on prior empirical work.

Rajan & Zingales (1995) examine several developed countries and identify the main firm characteristics which influence the decision of firms to prefer debt over equity in their capital structure. They find that tangibility of firm assets, profitability, size and market to book ratio are correlated with firm capital structure decisions. Pfaffermayr et al. (2013) further find that age is also correlated with firm capital structure. The relationship of each of these variables with firm leverage and issued capital will be discussed under each hypothesis. Market to book will however be excluded from our analysis due to lack of information as a significant amount of firms in Denmark are not publicly listed companies and market values are not available.

MacKay & Phillips (2005) show that financial structure of firms is jointly decided within industries and thus can be a significant driver of the firm's specific capital structure. Furthermore, region effects account for an increase or decrease access to sources of capital depending on region and competition among lenders within the region, which may also drive firm's decision as to the optimal capital structure. These represent further arguments for the inclusion of industry and region fixed effects within our models.

The next section will first outline the hypotheses related to changes in a firms' leverage and interest expense while the two later hypotheses, serve to gauge if the firms will compensate the reduction in bank loans with internal funds or equity. If firms do not manage to fully offset the decline in bank loans they will become financially constrained and effects on firm growth may be seen.

2.2.1.1 Bank Health and Leverage of Borrowing Firms

Following our identification strategy which describes a cut in credit supply by unhealthy banks, either following regulatory injunctions, or the liquidity squeeze and overall worsening of the financial sector with more pronounced effects on unhealthy banks, the first impact exhibited on borrowing firms should come in the form of reduced leverage. Previous research has uncovered that firms who had banking relationships with less healthy banks, were able to borrow less following the onset of the 2008-2009 financial crisis compared to firms who were customers of more healthy banks (Chodorow-Reich 2013). Furthermore the 2010 injunctions in Denmark evidenced a reduced credit supply by the banks that received the injunctions and a documented decrease in leverage for their corporate customers (Jensen Lærkholm 2015).

Thus our hypothesis is that controlling for the firm's characteristics, we would expect an unhealthy bank would have a negative effect on the debt levels of its borrowing firms.

Hypothesis 1: There is a significant relationship between bank health and the debt levels of borrowing firms. Firm's debt levels should be lower for customers of a less healthy bank.

Firms, however, might be able to compensate for the reduced credit supply by either switching lenders or through other forms of financing such as public debt markets in which case we will not be able to observe any relationship of bank health to leverage, which remains one of our main limitations throughout our research.

According to the firm characteristics that drive capital structure decisions as well as following previous studies on firm capital structure (Jensen Lærkholm 2015, Judge & Korzhenitskaya 2012) we will estimate the following model:

$$Leverage_{it} = \alpha_0 + \beta_1 BankHealth_b + \beta_2 LogTotalAssets_{i(t-1)} + \beta_3 LogFirmAge_{i(t-1)} + \beta_4 ZScore_{i(t-1)} + \beta_5 ROE_{i(t-1)} + \beta_6 InterestExpense_{i(t-1)} + \beta_7 BankControls_{b(t-1)} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (1)^1$$

Rajan & Zingales (1995) find the following relationships between firm characteristics and leverage:
The tangibility of assets is defined as property plant and equipment divided by total assets and is found to be positively correlated to leverage as firms with more tangible assets may use them as collateral. To account for the same effect we use Interest Expense in place for tangibility as a company with higher degree of tangible assets will drive a lower interest expense and thus a higher degree of debt. We thus argue that tangibility and interest expense can be used interchangeably, to account for the same firm characteristics and thus firms with lower interest expense are expected to exhibit a higher degree of leverage than firms with higher interest expense.

Profitability is found to be associated with less leverage as it represents availability of internal funds and companies preferring the use of internal funds to fund projects.

Size is found to have a positive correlation to leverage however, even though the authors pursue several theories in an attempt to explain the relationship such as size may be used as

[1] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

a proxy for probability of bankruptcy, they concluded that they do not really understand why size matters.

Pfaffermayr et al. (2013) observe that older firms exhibit smaller debt ratios, arguing that young firms typically lack sufficient internal funds to finance investment and due to uncertainty and information asymmetries have limited access to equity financing.

We further add a firm Z-score which represents the firm's probability of default in order to gauge the firm's bankruptcy risks, as firms with a higher probability of default may face higher interest rates and credit rationing from lenders as the banks increase the probability of losses on loans to these borrowing firms. Moreover, since the risk of bankruptcy increases with the amount of debt, we would thus expect that firms with a higher Z-score (thus a lower probability of default) will have less debt than firms with a lower Z-score, hence we expect an inverse relationship to leverage.

2.2.1.2 Bank Health and Firm Interest Expense

A weaker bank may face higher cost of funds due to its financial situation and, in the presence of informational or competitive frictions, will pass these higher costs onto the borrower loan rate. Hubbard et al. (2002) document that lower capitalized banks tend to charge higher loan rates than better-capitalized banks. However, banks may chose to address their weak financial situation by recurring to credit rationing as opposed to increased interest expense, due to the non-price-clearing mechanism documented in Stiglitz & Weiss (1981), and thus the borrower's costs of fund may not reflect the health situation of its lender.

Our second hypothesis therefore relates to borrowing firms interest expense.

Hypothesis 2: There is a significant relationship between bank health and the interest expense of borrowing firms. Firm's interest expense should be higher for customers of a less healthy bank.

To test the validity of our hypothesis and based on previous research (Hubbard et al. 2002, Jensen Lærkholm 2015) we will estimate the following model:

$$InterestExpense_{it} =$$
$$\alpha_0 + \beta_1 BankHealth_b + \beta_2 LogTotalAssets_{i(t-1)} + \beta_3 LogFirmAge_{i(t-1)} + \beta_4 ZScore_{i(t-1)} +$$
$$\beta_5 ROE_{i(t-1)} + \beta_6 BankControls_b + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib}$$
(2)[2]

As interest expense on bank loans arises due to the *external finance premium* and informational asymmetries it is dependent on the borrower's credit worthiness as outlined within the borrower balance sheet channel. The premium demanded should be a negative function of the borrower's financial position (Carlstrom & Fuerst 2001). Smaller, younger firms suffer from higher informational asymmetries and they are also the ones most likely to become financially constrained (Hadlock & Pierce 2010) thus would command a higher interest rate. Profitability is included within our model, as a lower profitability would decrease the borrower's net worth and thus command a higher interest rate as outlined within the borrower balance sheet channel. We further include the Z-score for firms as the probability of default. A higher probability of default, and thus a lower Z-score, would drive higher interest rates as banks lower their probability of repayment.

2.2.1.3 Bank Health and Firm Cash Holdings

Research has shown that financially constrained firms tend to hold more cash (Caldeira & Loncan 2013). Further research uncovered that firms engage in a certain amount of cash smoothing in order to finance investment when external financing is rationed (Fazzari & Petersen 1993; Calomiris et al. 1994; Hubbard 1997; Ogawa 2013). If firms indeed manage to fully offset the decrease in the supply of loans with internal funds, such as cash holdings, the effect of bank health on the firm may stop here, as firms will still be able to undertake all the profitable projects within their pipelines. Whether this is indeed the case will be examined within the next section.

Increase in cash holdings is also seen in Hubbard et al. 2002 research as precautionary savings by firms that are customers to weaker banks and thus may hurt investments as firms save more.

Our third hypothesis can be formulated as follows:

[2] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

Hypothesis 3: There is a significant relationship between bank health and the proportion of cash holdings of borrowing firms. Firm cash holdings should increase for customers of a less healthy bank.

In relation to our previous hypotheses, a less healthy bank is expected to cut the credit supply to a higher degree than a more sound bank, thus the borrowers of the less healthy bank would face a larger decrease in the availability of bank loans which will entail a larger amount of cash held in order to offset these effects. Following the research of Caldeira & Loncan (2013) and Ogawa (2013) we develop the following model:

$$CashHoldings_{it} = \alpha_0 + \beta_1 BankHealth_b + \beta_2 LogTotalAssets_{i(t-1)} + \beta_3 LogFirmAge_{i(t-1)} + \beta_4 Tangibility_{i(t-1)} + \beta_5 Leverage_{i(t-1)} + \beta_6 Cashflow_{i(t-1)} + \beta_7 BankControls_{b(t-1)} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (3)$$[3]

Why do firms hold cash? The static trade-off theory of cash holdings (Miller & Orr 1966) states that firm balances the main costs of holdings cash, which is the opportunity cost of holding no interest-bearing money, with the main benefit of holding cash, which is ensuring funding for future investments in the event of funding shortage, and thus an optimal amount of cash holdings would arise. For firms in which information asymmetries are greater, there is a higher tendency to become financially constrained and thus may borrow at a higher cost. Therefore, cash holdings will depend on individual firm's characteristics and will be higher for firms, which have a higher likelihood of financial constraint (Mcvanel & Perevalov 2008). Hadlock & Pierce (2010) show that Size and Age are particularly useful predictors of financial constraint levels, both having a negative impact on financial constraints, indicating that older or larger firms tend to be less constrained.

On the other hand, the Pecking Order theory of cash holdings states there is no target level of optimum cash, but that cash is viewed as a buffer between retained earnings and investments, as internal funding of investments is generally preferred to debt (Ferreira & Vilela 2004).

Further reasons for cash holdings include transaction motives and precautionary motives as outlined in the research of Bates et al. (2009). Transaction motives refer to the costs associated with converting a noncash financial asset into cash and since there are economies of scale with the transaction motive, large firms hold less cash, also because funding costs

[3] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

for larger firms are usually less costly, thus another reason for including the proxy for firm size within our model.

Within the precautionary motive, firms hold cash to better cope with adverse shocks when access to capital markets is more limited or costly. To this end, tangibility is included within our model to account for companies where the cost of external finance might be higher due to fewer tangible assets to offer as collateral (Opler et. al. 1999). Thus we would expect that the coefficient for tangibility would have a negative effect on cash holdings as firms with more collateral to offer have better access to external finance, are at a lower risk of being financially constrained and will therefore hold less cash for precautionary motives.

Furthermore, a firm will naturally save a portion of its cash flow for precautionary motives therefore a company associated with a higher ability to generate cash flow will also command higher cash holdings.

Leverage has been documented to have a negative relationship to cash holdings (Ferreira & Vilela 2004, Caldeira & Loncan 2013) as internal funding is generally preferred to external funding, recurring to debt as a second option to finance investments only when firms run short of cash. Thus higher levels of cash should be associated with lower debt ratios. On the other, hand higher leverage increases the probability of financial distress and could therefore cause firms to hold more cash (Ozkan & Ozkan 2004). Therefore, the particular effect of leverage on cash holdings is ambiguous.

2.2.1.4 Bank Health and Equity Issued by Borrowing Firms

Another way for firms to compensate the reduction in credit supply from lenders is to increase their issued equity. Research has shown that firms do indeed compensate for the contraction in credit supply by using internal funds, reducing dividends and issuing new equity (to a smaller extent) (Dwenger & Fossen 2015). If firms manage to fully substitute the reduction in credit supply, then the effects of bank health will be limited to the change in capital structure composition as firms will still be able to grow at the same rate as before. However, even if the credit shortage is fully substituted, effects on the overall cost of funds for the firm may exist due to the change in composition of firm capital structure, and projects, which were profitable before, might be rendered unprofitable under the new rate of funding. It is thus implied that while the decline in growth rate of a firm due to lack of bank funding may be attenuated by new equity issuance, it may not be fully offset.

Our forth hypothesis can be formulated as follows:

Hypothesis 4: There is a significant relationship between bank health and borrowing firms new equity issuance. New equity issuance should be higher for customers of a less healthy bank.

The hypothesis stems from the presumption that less healthy banks would reduce their credit supply to a greater extent than healthier banks, causing customers to be more financially constrained and look for alternative ways of financing their growth, such as issuing new equity. Based on the firm characteristics that drive capital structure decisions, discussed above, we developed the following model:

$$IssuedEquity_{it} = \alpha_0 + \beta_1 BankHealth_b + \beta_2 LogTotalAssets_{it} + \beta_3 LogFirmAge_{i(t-1)} + \beta_4 ZScore_{i(t-1)} + \beta_5 ROE_{i(t-1)} + \beta_6 Tangibility_{i(t-1)} + \beta_7 BankControls_{b(t-1)} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (4)$$[4]

Rajan & Zingales (1995) find that large profitable firms will reduce equity issuance drastically, implying a negative relationship between size and profitability to issued equity. Profitability is associated with availability of internal funds, which will be preferred to equity when funding investments. Large companies are seen as having fewer investment opportunities than smaller companies, according also to empirical research on firm growth (Jovanovic 1982 Haltiwanger et al.2013), and thus will reduce equity issuance.

Firm age is positively associated with equity financing as young firms typically lack sufficient internal funds to finance investments and due to uncertainty and information asymmetries will have less access to equity financing (Pfaffermayr et al. 2013).

Tangibility is included within our model as firms with lower asset tangibility are more likely to resort to issued equity since they have less collateral to provide to other banking partners or public debt markets.

The firm's Z-score is included within the model as a proxy for bankruptcy costs, as a higher probability of default would lead to a more probable credit rationing from lenders, due to "flight to quality" and thus a higher need to offset credit reduction with increased equity issuance.

It is important to note that while our hypotheses on firm capital structure allows for the drop in credit supply to be offset by cash holdings or issued equity, other forms of financing might be available to firms, such as public debt markets, that can offset the effects of bank

[4] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

health. Therefore, we may not be able to empirically prove our hypotheses due to the unobserved effects of other forms of financing available to firms.

2.2.3 Firm Growth

Going a step further beyond the effects solely reflected on the firm's capital structure, is analyzing the impact of bank health on firm's actual growth. Research indicated that financially constrained firms plan deeper cuts in spending and employment, while selling more assets to fund their operations. Further, firms' inability to borrow externally causes them to forego attractive investment opportunities and restrict investments for projects that did get acceptance (Campello et al. 2010). The hypotheses connecting bank health with firm growth have a starting point in the presumptions that lenders either cut credit supply and or increase loan rates thus leading certain companies to become financially constrained, as they will be unable to fully offset these repercussions through other forms of financing. It is worth noting that the overall level of investments decreased during the period following the 2008-2009 financial crises as explained throughout the section on the Danish financial crisis; however the state of bank health may have amplified this effect.

Firm growth has been defined in a number of ways by literature (Ardishvili et al. 1998 and Delmar 1997):

- The financial or stock market value
- The number of employees
- The sales and revenue
- The productive capacity
- The value of production
- The added value of production

Kirchhoff &Norton (1992) compared the three measures (employment, assets and sales) and showed that they are interchangeable as they produce the same results when tested over a seven year period.

Availability and cost of finance for expansion and availability and cost of overdraft facilities are documented by literature to represent barriers to firm's growth (Storey 1994). Thus financial constraints caused by the health of the financial intermediaries may prevent firms from growing at their full potential based on previous literature on transmission mechanism and the link between availability of funds and firm growth.

Our analysis of the effects of bank health on firm growth will firstly review firm's investments, if and to what degree these are affected by the health of the lender while subsequently analyze if these effects can be seen in the growth of the firm in term of both assets and employees.

2.2.3.1 Bank Health and Borrowing Firms' Investments

Several studies evidence the impact of bank health on the level of firm investments (Fukuda et al. 2005), Ma et al. 2011). They document that being a customer at a healthier bank would have a positive impact on investments. Dwenger & Fossen (2015) further provide confirmation of bank distress translating into fewer investments by the borrowers.

This leads to our fifth hypothesis being formulated as follows:

Hypothesis 5: There is a significant relationship between bank health and borrowing firms' investments. Investment should be lower for customers of a less healthy bank.

Ogawa (2013) however, documents a higher reliance on cash holdings and cash flow for investments the more bank health deteriorates. If firms manage to fully substitute the effects of bank health on credit supply with cash and cash flow then no effect may be evidenced on the level of investments. A strong relationship between cash holdings, cash flow and investments will however stand as evidence of external financial constraints faced by the firm. Fazzari & Petersen (1993) find that firms that do not have close ties to banks will exhibit higher cash flow sensitivity to investments, reflecting the costly external finance. Financial constraints are defined, within Fazzari and Petersen (Ibid.) study, as the degree to which firms are susceptible to informational asymmetries, or the external financial constraints on the firm. Firm size and age (Hadlock & Pierce 2010) are common measures of external financial constraints on firms, as smaller younger firms will face greater informational asymmetries. A firm's liquidity can also affect investments as firms can continue to invest by using their liquid assets, especially in the presence of asymmetric information (Myers & Majluf 1984).

Thus, the degree of external financial constraint, driven by informational asymmetries and the firm's ability to use internal funds to compensate for the lack of external finance drive the effects of bank health on investments. As a result, higher informational asymmetries would drive in a more pronounced effect of bank health on investments, while the ability to use cash flow and liquid assets to compensate will diminish the effect seen on investments.

Based on the research of Ogawa (2013) on what drives the degree of investments when bank health deteriorates we estimate the following model:

$$Investment_{it} = \alpha_0 + \beta_1 BankHealth_b + \beta_2 LogTotalAssets_{it} + \beta_3 LogFirmAge_{it} + \beta_4 ROE_{it} + \beta_5 Cashflow_{i(t-1)} + \beta_6 Leverage_{i(t-1)} + \beta_7 Cashholdings_{i(t-1)} + \beta_8 BankControls_{b(t-1)} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (5)$$[5]

Our measure for investments follows the research of Gugler & Mueller (2004) and entails the following components:

Investments = After tax profits +Depreciation –Dividends + ΔDebt + ΔEquity, where we exclude R&D and advertising expenditures, due to limited information on the two expenditures and their negligibility in estimating a proxy for actual investments.

Profitability, cash flow and cash holdings of firms are included in the investment model to account for the availability of internal funds and higher investment sensitivity to these variables can be evidence of greater external financial constraints. Leverage is expected to have a negative impact on investments as more levered companies may face a higher cost of external finance.

Firm size and age are proxies for informational asymmetries and expected to have a positive effect on investments.

Most prior empirical work included the Tobin's Q measure which proxies for investment opportunities faced by the company as a driver of firm investments. However, since we do not have access to market values used in the computation of Tobin's Q, we are unable to account for this particular driver.

2.2.3.2 Bank Health and Firm Growth

The influence of bank health on the growth of borrowing firms has been analyzed both in terms of firm's assets as well as firm's employees. Chodorow-Reich (2013) offers the main reference point to studying the effects of bank health on growth in employees, where evidence is presented that firms which had pre-crisis relationships with less healthy banks are associated with reduced employment. The research compares the employment and bank health between 2008 and 2009, while firm characteristics for age, size, and industry are accounted for. Furthermore, Dwenger & Fossen (2015) build on Chodorow-Reich (2013)

[5] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

research and study how the effect of credit supply by relationship banks affects firm outcomes in terms of number of employees. The research finds that firms whose banks reduced credit supply experienced a significant downsize in their labor employment.

Jensen Lærkholm (2015) analyzes the effects of bank injunctions on firm's asset growth and finds that while on average firms are able to mitigate the effects, young firms with negative cash flows are particularly susceptible to a reduction in their asset base.

We thus develop our sixth hypothesis:

Hypothesis 6: There is a significant relationship between bank health and borrowing firm growth. Firm growth should be lower for customers of a less healthy bank.

Based on the research developed by Gambini & Zazzaro (2013), who study the effect of long lasting bank relationships on the growth of firms we develop the following model:

$$FirmGrowth_{it} = \alpha_0 + \beta_1 BankHealth_b + \beta_2 LogTotalAssets_{i(t-1)} + \beta_3 LogFirmAge_{i(t-1)} + \beta_4 Cashflow_{i(t-1)} + \beta_5 Leverage_{i(t-1)} + \beta_6 BankControls_{b(t-1)} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (6)$$[6]

Firm growth will be analyzed alternatively as asset growth and employee growth, as these represent our chosen proxies for firm growth based on availability of data and previous research. The model, with alternate growth in assets and employees is developed by Gambini & Zazzaro (2013), and features a set of firm control variables:

Firm size and age are included as main control variables based on classical Gibrat regression models. Size will be measured alternatively in terms of assets and employees at the beginning of the growth period. Gibrat's law states that initial size of the company should not have a significant effect on firm growth, however other models (Jovanovic 1982, Stokes 1995) show smaller firms grow faster, while Haltiwanger et all. (2013), Storey (1994) show younger firms will grow at a faster rate than older firms. If firm size will be found to have a significant impact on firm growth, this will represent a violation of the classical Gibrat's law.

Gambini and Zazzaro further include controls for the availability of internal and external financial resources. Availability of internal financial resources is measured by the proxy of cash flow to total assets. A positive correlation between cash flow and growth is interpreted

[6] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

as firm being financially constrained on the credit markets (Carpenter & Petersen 2002). Leverage is used as a proxy for access to external finance resources, with research deeming it ambiguously associated with firm's growth as studies have found it positively, negatively and non-significantly correlated with firm growth (Gambini & Zazzaro 2013, Opler & Titman 1994, Honjo & Harada 2006).

Having identified each hypothesis and outlined a rough model which portrayed the firm and bank controls and the timing of their effect, we now turn to establishing the form of the proxy used for bank health as well as entailing the preferred method through which we will estimate the speficication.

2.3 Model Specification

Our dataset is a panel data, pairing firms' fundamentals and financials with their primary bank. Having access to panel data offers benefits over simple cross-sectional or time-series data. Baltagi (2008) summarizes the main benefits:

- Controlling for individual heterogeneity
- Provides more variability, less collinearity among variables, more degrees of freedom and more efficiency
- Enables studies of the dynamics of change
- Better at detecting and measuring effects that cannot be observed in either cross-section or time-series data
- Can minimize effects of aggregation bias

There are several methods for estimating regressions using panel data, thus this section will start by assesing the different methods, followed by a review of the construction process for the preferred specification.

2.3.1 Pooled OLS Model

A pooled OLS (Ordinary Least Squares) regression ignores the cross-sectional and time series aspect of the data and pools the data into one grand regression. This effectively restricts the explanatory variables' coefficients to remain unchanged between time periods. The intercept of the model is also restricted to remain the same for all firms. This may lead to heterogeneity bias due to unobserved individual heterogeneity. Unobserved individual heterogeneity relates to omitted variables, which are fixed or time-invariant and specific for each individual. This unobserved time-invariant effect will be captured by the error term

and might be correlated with the explanatory variables, which will result in biased and inconsistent estimates.

Further issues relate to the classical assumptions of BLUE (best linear unbiased estimators) OLS estimators, which may be violated due to heteroskedasticity and autocorrelation concerns when dealing with panel data. Heteroskedasticity is specific to cross-sectional data and arises when variance of a variable is unequal across the range of values of the explanatory variables. Should we take leverage as an example, leverage's variance might not be equal across all firms as smaller firms may, in general, have less leverage than larger firms, thus the variability in leverage for smaller firms is smaller than the variability of leverage for larger firms. Autocorrelation problems arise in time-series data where the dependent variable is correlated with its own past and future values such that the leverage of a firm at time t is correlated with the leverage of the same firm at time t-1. Both heteroskedasticity and autocorrelation problems may cause inflated or deflated standard errors and thus may cause coefficients to be significant when in fact they are insignificant and vice versa.

2.3.2 Fixed Effects Model

The Fixed Effects Model is an alternative procedure to estimate a panel data model and allows for each cross-sectional unit to have a different intercept, thus eliminating the heterogeneity bias as each intercept will contain the time-invariant omitted variable. The error term will be independent of the explanatory variables once again. The time –invariant variables are referred to as the fixed effects. Allowing each individual to have its own intercept is done by using dummy variables for each individual (except one, which will be the reference point). This method is known as the Least Squares Dummy Variable Model (LSDV). However a significant issue arises when the number of cross-sectional units is very large, as this will require a large number of dummy variables (for each cross-sectional unit), which will consume a large amount of degrees of freedom, leaving a smaller number of independent information available to estimate the parameters.

An alternative to the dummy variable strategy is the Within-Group estimator that employs a transformation of the equation by differencing. For example, taking the first difference will remove any time invariant components of the model as each variable will have its mean (across time) subtracted. The average across time will contain all the time invariant effects.

By subtracting them from the original variable, the model will be free of unobserved individual heterogeneity.

2.3.3 Random Effects Model

The random effects model is meant to tackle the fixed effects model's problems concerning the number of dummies needed to allow for each cross-sectional unit to have its own intercept. Thus the random effects model is based on the assumption that the intercept for each individual is drawn from a distribution, making each intercept a random draw from the distribution. This ensures independence of the of the error term for any observation and allows more degrees of freedom that the LSDV. However, one of the main drawbacks of the model is the assumption that the fixed effects are not correlated with the explanatory variables in order to avoid omitted variable bias. This may be an overly strong assumption.

After reviewing the main methods for estimating panel data models, it is clear that the main concern being addressed with each model is unobserved individual heterogeneity. Within the context of our own research, eliminating this issue would require an experiment where borrowers were randomly assigned to banks. This would eliminate the problem that some unobserved variable causes certain firms to borrow from certain banks, thereby identifying the effects of an exogenous variation in bank's health. In the absence of such an ideal experiment, a commonly used method in the literature (Jensen Lærkholm 2015, Abildgren et al. 2011, Hubbard et al. 2002), is to control for bank and firm characteristics and include industry, region and legal form fixed effects to reduce the scope of potential unobserved fixed effects.

Therefore, our choice of model to estimate bank health effects on borrowing firms, is the pooled OLS model. Our decision is based on previous work (Leary 2009, Judge & Korzhenitskaya 2012) and the argument that we are able to control for a wide range of borrower and bank characteristics as well as the inclusion of industry, region and legal form fixed effects. To tackle the issue of autocorrelation encountered as well as to account for the potential persistence of the unobserved borrower heterogeneity, despite our inclusion of industry, region and legal form fixed effects, we employ standard errors adjusted for clustering at the firm level. Clustering at firm level controls for residual correlation across years for a given firm and represents an alternative method to control for firm fixed effects. Using clustered errors produces unbiased OLS estimates, however standard errors may still be inflated, due to heteroskedasticity, which may lead to incorrect inference. To account for

the heteroskedasticity problem we use heterokedasticity-robust standard errors, also known as Huber-White standard errors.

Given the large number of firms included in our dataset, we argue that this method would entail greater degrees of freedom as controlling for firm characteristics and firm fixed effects through clustering releases the need to add fixed effects dummies for each firm. Furthermore we do not need to estimate the distribution from which these effects are drawn; enabling us to bypass the strong assumption that fixed effects are uncorrelated with the explanatory variables, as under the random effects model. We thus argue that this method of estimation is best suited for our dataset and identification strategy and will be applied uniformly for all our hypotheses testing.

A further concern with our estimation is multicolinearity, or the correlation between the different explanatory variables included within each model. In the presence of multicolinearity individual effects pertaining to the specific explanatory variable can no longer be isolated as the effect may be attributed to the movement of the correlated variable and not necessarily to the variable of interest. To account for this specific problem we perform a correlation matrix for all variables included within a model and eliminate all variables that exhibit a high correlation with one or more explanatory variables included within the model.

2.3.4 Preferred specification

Within bank health we will use alternatively bank injunctions and the bank Z-score for each of the hypothesis and identify the preferred specification for each of the health proxies.

When using the injunction as proxy we record a dummy variable, which takes the value of 1 if the bank has received an injunction in 2010 and 0 otherwise. The model will be based on 2010-2012 data as specified within the identification strategy and will include first only the effect of the injunctions in 2010, assuming the effect is insignificant afterwards, second the effect of the 2010 injunctions in 2010 and 2011 (a new injunction variable will be added which represents the initial injunction variable, lagged once) and third the effect of the injunctions on firm dependent variables in 2010,2011 and 2012 (the injunction variable will be lagged twice).

Equations (7), (8) and (9) below show the specifications we will estimate in order to identify the extent of the effect of injunctions on each dependent variable. The strength of the effect will be measured by the size and significance of each of the coefficients, where

smaller insignificant effects will be eliminated from the model going forward. We will implement this methodology for each hypothesis, allowing for differences in timing of effects for each dependent variable.

$$Firm\ Dependent\ Variable_{it}^{10-12} = \alpha_0 + \beta_1 Injunction_{i,b}^{10} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (7)^7$$

$$Firm\ Dependent\ Variable_{it}^{10-12} = \alpha_0 + \beta_1 Injunction_{i,b}^{10} + \beta_2 Injunction_{i,b}^{11} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (8)^7$$

$$Firm\ Dependent\ Variable_{it}^{10-12} = \alpha_0 + \beta_1 Injunction_{i,b}^{10} + \beta_2 Injunction_{i,b}^{11} + \beta_3 Injunction_{i,b}^{12} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (9)^7$$

When using Z-score as a proxy for bank health, we will implement a similar methodology, however, due to a high correlation between Z-Score lagged once and Z-score lagged twice (0.6) these will not both be included within the same model. To this end, we will specify individual models for each of the lags and choose our baseline model based on the strength of the relationship to the dependent variable, measured by size of the coefficient and its significance. Equations (10) and (11) outline the initial models, where the period is 2008-2013 as stated within the identification strategy.

$$Firm\ Dependent\ Variable_{it} = \alpha_0 + \beta_1 BankZscore_{i,b}^{t-1} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (10)^7$$

$$Firm\ Dependent\ Variable_{it} = \alpha_0 + \beta_1 BankZscore_{i,b}^{t-2} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (11)^7$$

Firm fixed effects, legal form, industry and region effect are included within these initial specifications.

Once we have identified the extent of the effect of the injunctions and the length of the effect of the bank Z-score we build our model by adding firm control variables according to each hypothesis and bank control variables. Adding both firm and bank controls is an essential step as our identification strategy and estimation method both rely on us controlling for the difference between firms which may cause differences in the dependent variable as well as in bank health and accounting for bank risk. Therefore, within each

[7] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period. Individual variable calculations and definitions can be found in Appendix A

estimated model we argue that, not including a part of these controls may cause bias in our estimates, therefore, unless strong reasoning is present our preferred specification will include both firm and bank controls. Thus our complete model can be outlined as in equation (12) where the coefficient of interest will be β.

$$Firm\ Dependent\ Variable_{it} = \alpha_0 + \beta BankHealth_{i,b}^{\tau} + \gamma FirmControls_{i(t-1)} + \delta BankControls_{i(t-1)} + \alpha_1 LegalForm_i + \alpha_2 Industry_i + \alpha_3 Region_i + \varepsilon_{ib} \quad (12)$$[8]

Bank health within the model above will represent alternatively the chosen lag for the injunction variable and the chosen lag for the z-score variable. Firm controls are the ones outlined within the hypothesis section, while bank controls are presented within the identification strategy.

The preferred models will then be tested for robustness.

Having outlined the identification strategy, hypotheses and the model specification we proceed to outline the results of our empirical analysis.

3. Empirical Analysis

This section will start first by presenting a general description of the dataset used in terms of both explanatory and dependent variables, followed by an exposition of the results obtained by estimating our preferred specifications.

3.1 Data Description

We will start by giving an account of the datasets used and the criteria applied in reaching the final dataset used as well as its characteristics. The general firm characteristics will be described and a further analysis of descriptive statistics for the explanatory and dependent variables will be presented.

The sample used in the analysis is based on several datasets from Experian, one file from the FSA with the Supervisory diamond ratios for the 140 banks under its supervision and a

[8] Where subscript i refers to individual firms, subscript b refers to individual banks and t refers to the time period and τ shows the preferred time lag for bank health effect. Individual variable calculations and definitions can be found in Appendix A

proprietary dataset with regions, municipalities and zip-codes based on publicly available information from Post Danmark.

The datasets used from Experian contain financial information for the firms and banks aggregated for the entire period, the relationship of firms and their primary bank for all years of interest, firm level data on industry, year of establishment and other key indicators. For both Experian and the FSA data, the unconsolidated numbers will be used since unconsolidated does not mean by individual branch, but by type of business, i.e. banking services for Nordea and excludes custodian services as a distinct entity included in the consolidated data, and for the purposes of this research unconsolidated data was the appropriate form to use.

The firm dataset for 2008-2013 initially comprised of 1,276,061 observations with an average of 255,212 firms by year and contains data for the income statement and balance sheet components.

However, the firm-main bank dataset contains only 18,929 unique firms that report one bank as their main financial institution. The merger of these files based on the unique identifier of each firm resulted in a dataset with only 5,652 unique firms and 13,335 observations for the period of interest. The resulting file was afterwards merged to add the bank variables from the Supervisory Diamond, the financial data for the banks and the geographic data. The final dataset contained industry filters to exclude financial institutions and utility companies. The sample restriction with respect to utility companies stems from the regulation aspect pertaining to this industry, which is assumed to have a significant impact on the development of this sector during the crisis. Including the utility companies might bring distortions to the results of the analysis, thus they were eliminated. Excluding financial firms is common for the literature reviewed of the effects of bank health on firms whereas our exclusion of utility companies follows research on firm governance and investments (Poulsen 2013).

The sample is also restricted based on the firms' status, thus, inactive firms were eliminated as well as shell companies defined as pre-registered companies since formation with no business activity. Another criteria applied to the dataset was to exclude firms with negative equity.

The final dataset contains 8,097 observations and 3,827 unique firms across the 6 years of interest with a heavier distribution towards 2013 with 37% of the sample in 2013 and only 8% in 2008 and around 11-17% in the years in between. The data is characterized as short

panel data since there are 3,827 companies and only 6 years, therefore there is broad cross-sectional width but short length of the time-series. It is unbalanced since not all firms contain observations for the entire period.

The dataset has a strong bias towards professional services and retail in terms of industry distribution as seen in Fig. 12.

At an aggregate level, in the industry distribution in Denmark, "Trade and Transport" is the predominant sector and "Other Business Services" is the second largest industry by number of enterprises in 2013 as seen in Fig. 13. Since the retail sector is presumably included within "Trade and Transport" as it is not a standalone sector and that the samples' professional services overlaps in many sub-sectors with "Other business services" it can be assumed that the sample is representative of the industry distribution to a good degree.

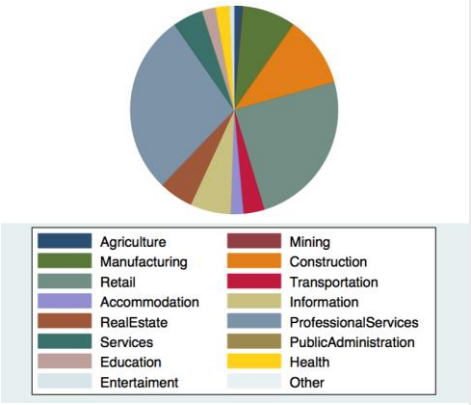


Figure 12 Sample industry distribution**, own creation**

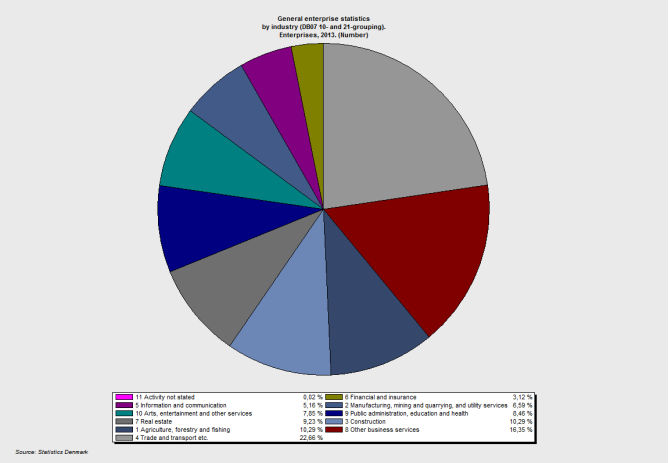


Figure 13 Denmark industry distribution
Source: Denmark Statistics

With respect to the size of the firms, the sample has a bias towards firms that report 0 employees across all years. However, across all firms in Denmark, the largest proportion of firms have between 2-9 employees and that is the second majority in the dataset at hand which is shown in Fig. 14. That shows that, while the sample is not a perfect representation of the population, it also encompasses a strong predominance of very small firms, with less than 10 employees for the entire period which is the reality of the business sector in Denmark overall, shown in Fig. 15.

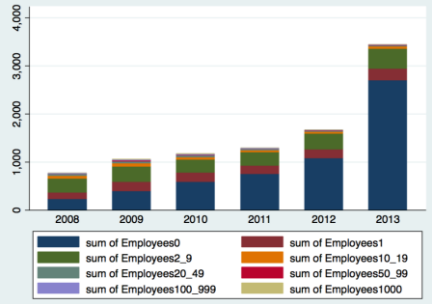


Figure 14 Sample No. of employees,
own creation

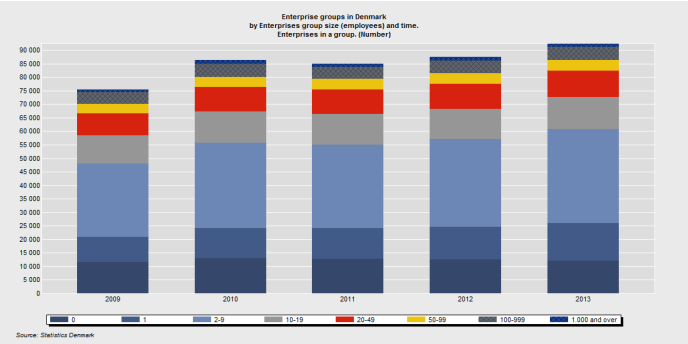


Figure 15 Denmark No. of employees
Source: Denmark Statistics

In terms of regions in the sample there were 8 firms from Greenland, an autonomous country, part of the Kingdom of Denmark. The majority of firms are from the region of the capital, Copenhagen and surrounding areas with 40% representation in the sample. Given that a significant number of companies are headquartered in the capital and various industrial clusters and administrative bodies are also in Copenhagen, that seems reasonable. The *Syddanmark* region is the home of 21% of the observations, *Midtjylland"*15.6%, *Sjaelland* 15.6% and *Nordjylland* the remaining almost 8%. Therefore, it can be said that in terms of industry, size and geographic distribution the sample does not contain a significant bias compared to the characteristics of firms across Denmark.

The banks that were taken over by the FSC during the bank packages were removed from the sample once the take-over was effective given that the strategic management of those banks became about selling the profitable assets and transferring clients while wounding up the remaining operations. And therefore, keeping that data in the sample would have most likely interfered with the results of the analysis of banks operating on a going concern principle.

The motivation for comparing the sampled firms' characteristics to those of the aggregated business sector of Denmark stems from understanding any underlying bias involved in the firms' structure that can influence their behavior and the results obtained.

Based on the observations made above, it can be said that the sample does not contain a significant bias towards a particular group of firms that may interfere with the capacity of generalizing the results.

3.2 Descriptive statistics

3.2.1 Final Dataset

The data has both cross-sectional and time-series characteristics, therefore it is defined as panel data. The advantages of using panel data include less collinearity between variables, more degress of freedom and a greater degree of variability. Panel datasets are also capable of controlling for individual heterogeneity, which could lead to bias in pure cross-sections or time-series. (Baltagi & Song 2006)

Compared to either time-series datasets or cross-sectional, panel data supports analysis on the more complex issues of dynamic behavior. (Gujarati 2004)

As mentioned, the dataset contains entities that do not have observations for the entire period of interest. That means that the panel data is unbalanced. An advantage of using unbalanced panel data is that of avoiding survivorship bias. The 2008-2013 period captured the manifestation of the financial crisis and as seen, a number of firms went bankrupt during the period. It would be expected that firms still in existence in 2013 were in some way stronger, higher performers and restricting the sample only to these firms would introduce a survivorship bias in the data.

To generate the final dataset, some variables have been transformed. While the data provided by Experian has been deemed reliable and with a good degree of validity, errors in data entry or collection are not uncommon in empirical work. The distribution of some of the variables has been deemed as highly skewed and thus a logarithmic transformation was applied. These variables are: "*TotalAssets", "Employees"* and *"Firm age"*.

Outliers have been identified and they are believed to be also a cause of data entry or collection. We have winsorized variables to mitigate the influence of extreme values and minimize the impact of data coding errors on the analysis. Winsorizing is one outlier treatment method, which entails that the extreme values are substituted with values closer to the mean based on a chosen level (Ghosh & Vogt 2012). In this case, variables have been winsorized at the 1% level, therefore, the highest values of the variables have been replaced with the value corresponding to the 99^{th} percentile and the lowest with the 1^{st} percentile value. This approach has been used in other empirical studies based on firm level data, and in a study using a similar version of the dataset also from Experian on Danish firms and banks (Jensen Lærkholm 2015).

As seen in Table 33 in Appendix D several firm ratios do not make sense from an accounting perspective, which was observed to be caused by very few observations with unusual values which were assumed to be clerical errors. And foremost, as the Z-scores calculated are used as proxies for firm and bank health and they rely on several accounting items' value, the distortions resulting in a Z-score of -12.4 as the mean for banks suggests that measurement or clerical errors were involved. To increase the robustness and reliability of the analyses, winsorizing was considered a reasonable treatment to account for the errors identified.

3.2.2 Firm Outcomes

The firm variables to be used throughout the regressions as explanatory will be described through the number of observations, mean, standard deviation and the minimum and maximum values, while the statistics can be seen in Appendix D Fig. 34, 35, 36. While some of the dependent variables are used as explanatory in some of the regressions, they will be discussed only once in this section.

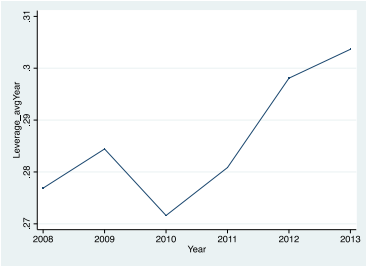


Figure 16 Leverage average per year, **own creation**

"*Leverage_TD_TA*" has a mean of 0.29, thus on average firms' total book value of debt is almost a third of the book value of assets. As expected, the variability between companies is greater than for each company across the time period. In terms of the change over time in leverage it is important to note that there is a positive growth trend in the overall level from a value of less than 0.28 in 2008 to more than 0.3 in 2013, as shown in Fig. 16. Firms' leverage increasing during and after a recession can have several underlying reasons, lower demand being an important one.

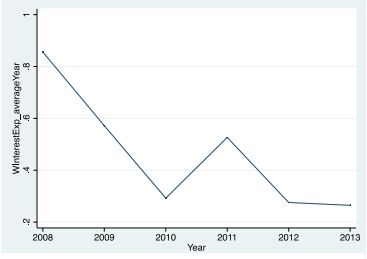


Figure 17 Interest Expense average year, **own creation**

"*Interest Expense*" across the firms and the years implies almost a 39% interest rate with extreme variability between the firms and within the period for individual firms. However, the ratio is a rough estimate of the financial expenses on the income statement, which might also include debt to secondary lenders or issued debt in addition to the debt owed to their primary bank.

The evolution of the interest rate features a significant drop from more than 80% in 2008 to less than 30% in 2010. The development is generally attuned to the trend for the bank's average deposit and lending interest rates for non-financial corporations (Fig. 7) seen in the analysis of the financial crisis in Denmark.

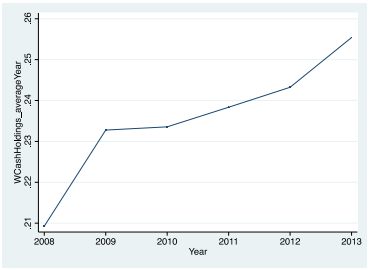


Figure 18 Cash Holdings average per year, **own creation**

The "*Cash Holdings*" has a mean of 24.2% and represents the amount of cash relative to the total assets of firms that firms hold during the period.

Once again, the main source of variation in this variable as well comes from the between classification, which is reasonable given the diversity of the firms in many respects. However, there is a positive trend in cash holdings across the companies, which might suggest than even though return on equity was decreasing, perhaps companies were holding on to more cash and cash equivalent securities rather than investing it or making payments to equity holders. Over the 2008-2013 period the average cash holdings increased from 21% to 25.5% as relative to total assets, which is in line with how firm profits develop.

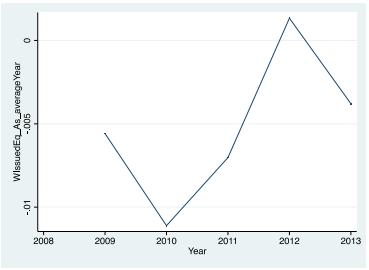


Figure 19 Issued Equity average per year, **own creation**

With a mean of -0.47% the change in issued equity on a yearly basis as a proportion of total assets suggests a contraction of shareholder equity across the period.

2012 was the only year with a positive mean of issued equity, meaning that the equity that firms had in 2008 is expected to have been reduced by 2013 (Fig. 19) through share buybacks or due to incurring losses. Issued equity will be used as a dependent variable to uncover potential explanations for this development.

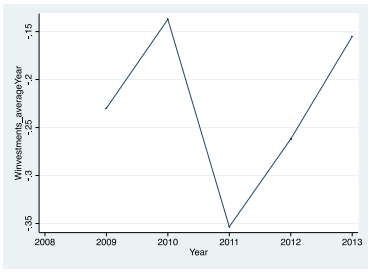


Figure 20 Investments average per year, **own creation**

"*Investments"* has a mean of -21.9% as investments relative to total assets. And while most variation is between firms, the standard deviation within the time period at firm dimension is 117% which is extreme and would suggest that firms resorted to extreme changes in investments in the period observed. Investments includes in the calculation changes to the total debt and equity in the firm and thus, for 2008 the value could not be included. 2011 was a drastic year in terms of investments as the mean reached -35% of total assets (Fig. 20).

Another dependent variable to be analyzed is the difference of assets from year to year "Δ *Assets*" which is on average negative inferring a contraction of assets in the period of almost 0.03% per year (Fig. 21).

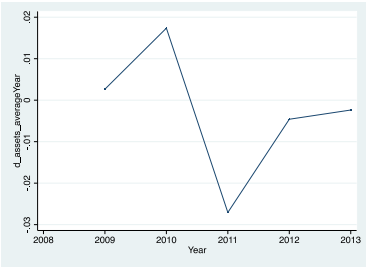


Figure 21 Assets average per year, **own creation**

The contraction can be due to numerous factors, including contracting inventory levels, lowering receivables due to lower demand, conservative depreciation and impairments or disposal of assets.

The change in number of employees expressed in the "Δ Employees" variable has a mean of -0.01 implying a contraction of staff across the period and all firms.

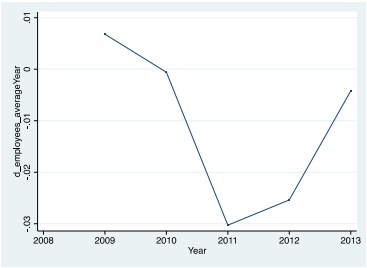


Figure 22 Employees average year, **own creation**

With respect to the development over time of the change in employees, we can observe that there are similarities to the growth in assets, with a significant drop in 2011 and growth thereafter (Fig. 22). Considering that the change in assets and employees are used to explain firm growth, it is noteworthy to pinpoint changes in the overall growth for the firm, estimated through either of these variables.

3.2.3 Firm explanatory variables

"*ROE"* has a mean of 16.9% as Net Income/Equity for 8091 observations. However, the standard deviation is 128% showing that there is a very high level of variability, which is mainly between firms rather than within where the standard deviation is 40% lower. Nevertheless, the within variation, meaning for the same firm across the period, is substantial.

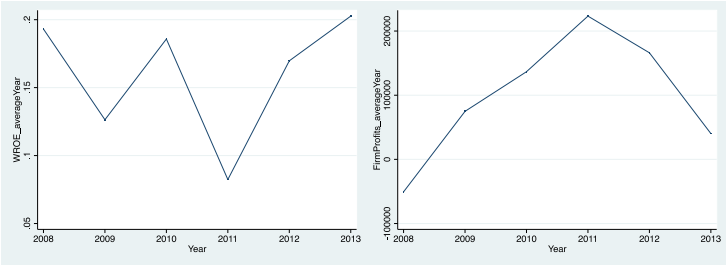


Figure 23 ROE and Profits average per year**, own creation**

The development of the average *"ROE"* for all firms, features a trend determined by large swings, with a minimum of around 7% in 2011 but a steady level in 2013 relative to 2008 at around 20%. Looking at the development of after-tax profits we can see that in 2008 profits were negative and continued to increase until 2011, followed by a decline until 2013 (Fig. 23). Thus, we would expect that the shareholder equity would be have an important role in determining the fluctuations in return on equity.

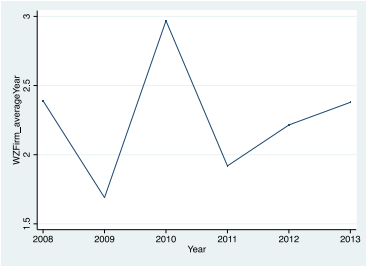


Figure 24 Z-Score Firm average per year, **own creation**

"Firm Z-score" is the Z-score calculated for the firms as a proxy for their overall health level. The mean is 2.3, which suggests that the firms were in a so-called 'grey' area, where the risk of default is not imminent, yet they are not considered in good shape. The extremely large variability in the ratio shows the turbulent times that the firms were exposed to as well as the degree of differences in the firms' profitability profiles.

As for the return on equity, the calculated Z-score has more variability across firms, but a very high level of within variability as well, suggesting that the period we are looking at was characterized by significant turbulences for both the profitability and thus, the health of the firms. The mean of the Z-score across the years follows a very similar trend with the return on equity denoting the fact that they are intrinsically linked.

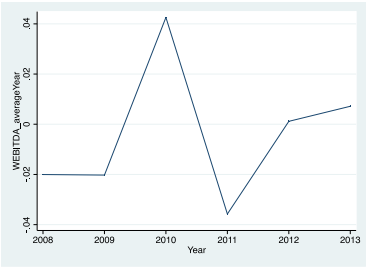


Figure 25 EBITDA average year, **own creation**

As a proxy for cashflow, EBITDA/Total Assets was used. Its mean is negative across the years with a value of -0.07% which means that firms had negative operating incomes. Within variation for this variable is higher than between suggesting that the time effects for this period had a stronger impact on the mean than the individual firm effects.

Although mainly negative, the highest growth observed was in 2010 with a value of 0.04 as the mean for EBITDA relative to total firm assets, and in 2012, 2013 it grew to positive levels. (Fig. 25)

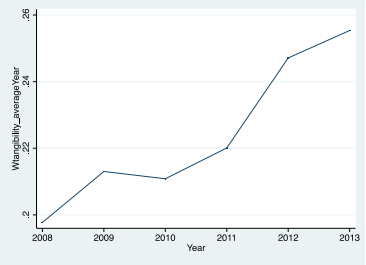


Figure 26 Tangibility average per year, **own creation**

"Tangibility" which refers to the proportion of property, plant and equipment of the total assets of a firm has a mean of 23.4%, with a 28.2% standard deviation over both panels and time series. Most of the variability stems from the differences between firms, and with respect to within firm variation it is not as drastic as the previous variables, suggesting that changes to the proportion of tangible assets are less dynamic, at least for the period observed. It would seem though that the direction of the change is towards growth as the proportion increases from a 19% level in 2008 to more than 25% in 2013 (Fig. 26) However, both the increase in cash holdings and the increase in tangible assets could also be explained by a contraction of the balance sheet of firms

through inventories and/or receivables. This could, in turn, increase the relative proportion of tangible assets and cash, as in times of lower demand these current assets would be likely to be impacted at a faster rate than the long-term fixed assets.

3.2.3 Bank level data

3.2.3.2 Injunction

Bank health is estimated from the regulatory perspective, through the injunction variable. The banks that did receive the injunction and are in the dataset are: Danske Bank, Sydbank, Alm. Brand Bank, Sparekassen Kronjylland, Amagerbanken, Aarhus Lokalbank, Hvetbo Herreds Sparekasse, Spar Salling Sparekasse. And there were 3 banks that did receive injunctions that are not part of the sample, these are: Vordingborg Bank, Sparekassen Østjylland, Sparekassen for Nr. Nebel og Omegn. However, in our sample they were not indicated as primary banks for firms that met the inclusion criteria for the dataset.

In our sample, the share of observations pertaining to the injunction banks is close to 42%, meaning that even though the injunction was effective for only 8 banks, the coverage among firms is substantial.
When inspecting the Z-score for the banks that received an injunction we find that the mean across the years is 0.61 compared to a 0.47 for the entire sample. Before the injunction in 2010, the Z-score is 3.29 for both injunction and non-injunction banks. However, after the injunction the Z-score for the injunction banks is 0.33 and for the rest of the banks the mean is 0.11. This suggests that the banks that were required to increase the capital level were practically identical to those that did not receive injunctions, from a Z-score perspective, but once they had higher capitalization they were in a better shape after 2010, when as a whole, the health level of the banking sector worsened.

Furthermore, an analysis of the group of borrowers from injunction banks compared to firms whose banks did not receive injunctions will be performed. The goal of this section is to identify differences in terms of the capital structure and growth but also firm characteristics that might interplay in the results of the analysis of bank health on firms. To understand the capital structure, debt levels across the groups will be observed and assets will account for the growth aspect.

Firstly, one approach to studying the effects of the injunction would be to study the change in the firm outcomes from before the injunction, i.e. 2009 and after, i.e. 2011. For this

analysis to provide meaningful results, the same group of firms should be studied. Fig. 28 portrays the firms' yearly mean debt and total assets for the firms that remain in the sample throughout 2009-2011. There is no distinguishable difference between the assets or debt of firms with injunction banks and those with non-injunction banks, neither before nor after the injunction. This brings evidence of potential survivorship bias, as firms who remained in the sample throughout the period do not seem to be bank-dependent borrowers, and thus may have been in better financial position to withstand potential bank health effects.

Secondly, Fig. 27 shows the firms' yearly mean debt and total assets for the period of 2008-2013 for both firms borrowing from injunction banks as well as those borrowing from non-injunction banks. Both the debt and the assets seem to be following roughly the same trend for both groups before 2010, which reassures that the firms are roughly balanced between the two groups for these observable characteristics. It further provides evidence of the potential effect of the injunctions, which may be seen as a widening gap between the firms borrowing from an injunction bank and the others, with firms pertaining to the injunction group showing significantly lower leverage and lower assets after the 2010 injunctions. While the firm debt resumes its trend in line with the non-injunction group after 2012, implying that after banks have reestablished the minimum capital required, they will resume lending in line with non-injunction banks, firm assets seem to continue a further widening gap and downtrend.

The comparison of the firms that remained in the sample during 2009-2011 and all firms provide evidence of a potential survivorship bias, supporting the decision of including all firms when studying the effects of injunction on firm outcomes.

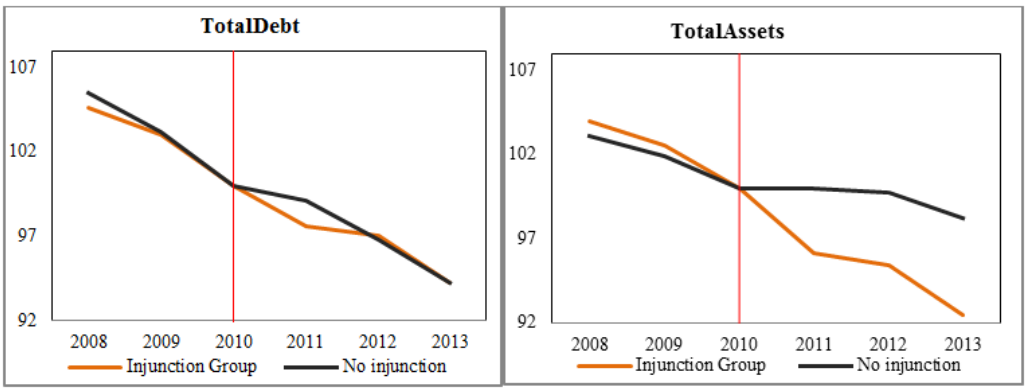


Figure 27 Debt and Assets of Injunction vs. non-injunction firms all sample, own creation

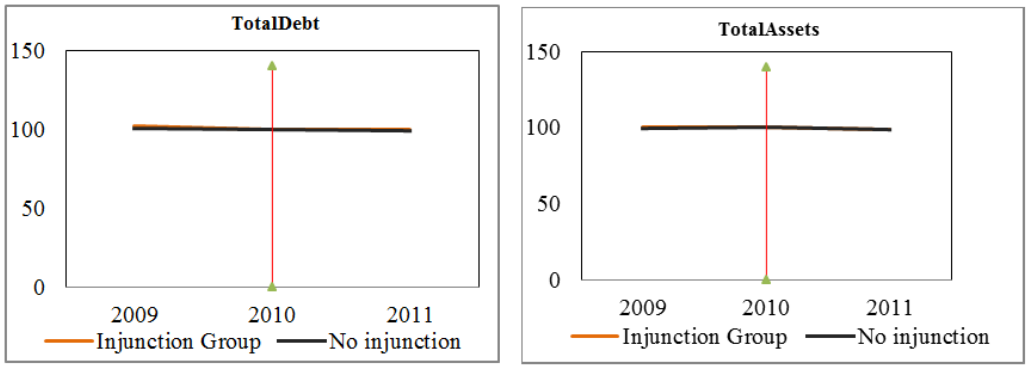


Figure 28 Debt and Assets of Injunction vs. non-injunction firms only 2009-2011 surviving firms, own creation

Furthermore, as seen in Table 1, below, when regressing all firm outcome variables and the injunction measure for the years 2008-2009, the effect is not significant. This means that in the years prior to the injunction, there were no significant differences between the firms with non-injunction bank and the borrowers from banks that did receive injunctions among any of the firm outcomes. Therefore, seeing as there are no underlying unobservable differences in these firms, which exhibit similar behavior in 2008, 2009, it should be expected that there would be no significant differences among the two groups in the following years while any observable difference would be caused by their primary bank's behavior and not unobserved firm characteristics.

Table 1 2008-2009 Injunction and firm outcomes

VARIABLES	Leverage	AssetGrowth	IssuedEquity	Investments	CashHoldings	Employees	InterestExp
(2008-2009)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
InjunctionGroup	**-0.005**	**-0.0208**	**0.0021**	**-0.0250**	**0,1006**	**-0.0081**	**0,6569**
	(0.012)	(0.029)	(0.006)	(0.092)	(0.016)	(0.036)	(0.600)
Observations	1,556	1,276	1,276	1,263	1,483	709	1,411
R-squared	0.031	0.019	0.007	0.022	0.060	0.030	0.009
Industry FE	YES	YES	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES
Adjusted R-squared	0,130	0.004	-0.008	0.006	0,331	0.003	-0.004

3.2.3.2 Z-score

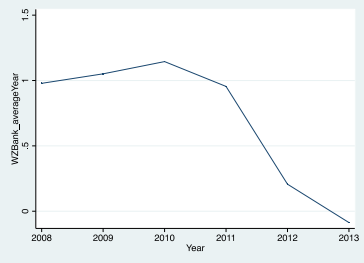


Figure 29 Z-score bank average year, own creation

Bank health is also represented by the calculated Z-score and overall it has a mean of 0.47, which implies a very poor state of the banks' situation, also compared to the 2.3 mean of the firms' Z-score. The variability is very high both by time and by individual bank. Moreover, the very high degree of variability for individual banks suggests the tumultuous dynamics of the period analyzed. To exemplify, the greatest variability for a bank in its probability of default measured through the Z-score ranged in a period of 6 years from 2.73 which denotes a good state to a value of -2.12 where it is greatly below the level of 1.1 where firms would be practically considered bankrupt. This stands to prove the magnitude of the deterioration of the health of banks over a relatively short period of time and gives cause to investigate the potential transmission of their health deterioration onto their corporate customers. The deteriorating trend is also seen when plotting the mean Z-score per year.

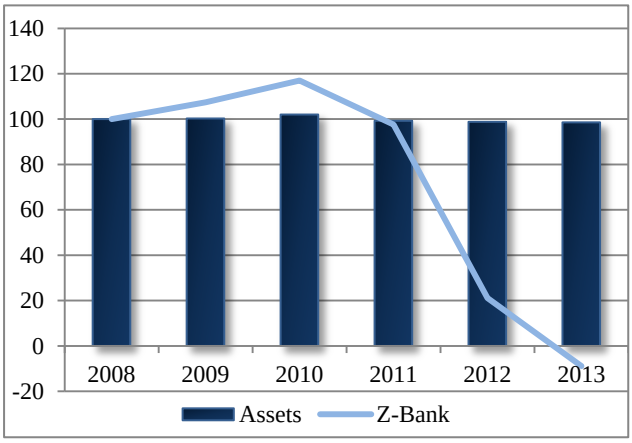


Figure 30 Z-score bank and firm assets, **own creation**

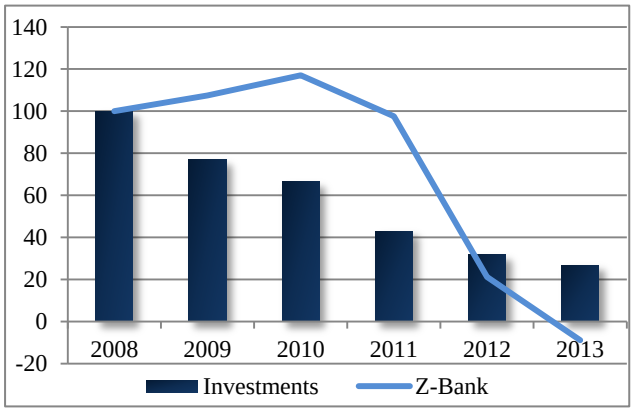


Figure 31 Z-score bank and firm investments**, own creation**

Plotting the development of the Z-score throughout time with several of the dependent variables used to measure firm effects in Fig. 30, 31, 32, the results suggest the possibility of a correlation.

With respect to the level of total assets, following 2010 there is a similar trend of negative growth as is for the health of the bank. But that is to be expected, as a 50% decrease in the overall level of the health of the bank would not be assumed to translate in an equal contraction of the assets for all of its corporate customers given the idiosyncrasies of firms industries, capital structure, tangibility, age and other individual firm factors.

When visualizing the level of investments across firms and the health of the banks we see a similar declining trend over the entire period. It could be inferred that based on the mean levels of investments and health of the bank the thesis put forward in *Hypothesis 5* may be true and gives motivation to investigate further the causality of bank health on firm investments.

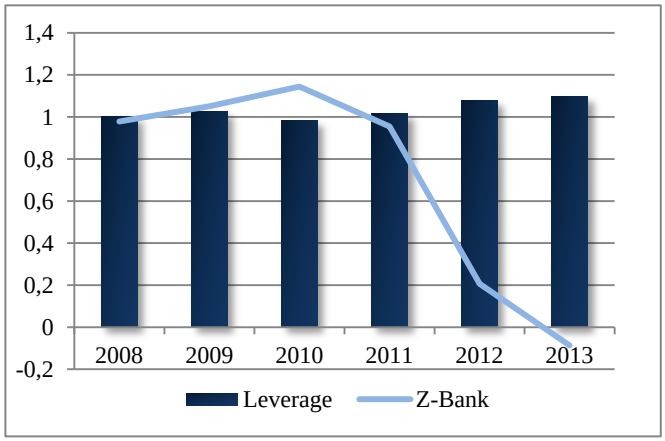


Figure 32 Z-score bank and firm leverage, **own creation**

Concerning the firm capital structure, the average leverage across firms per year and the Z-score for banks seem to follow almost a negative relationship. With the highest level of firm leverage in 2013 when the health of the banks estimated through the Z-score reaches a negative value. However, it is expected that the relationship is causal and the previous year's Z-score for banks would impact the current year firm leverage.

Apart from the Z-score and the injunction status which estimate the general health level of the bank, we will use 4 bank variables as control for bank risk. A short data description on these variables can be found in Appendix D.

3.3 Empirical Results and Robustness

This section will outline the empirical results of our analysis and discuss their robustness within each hypothesis. Most models follow the same robustness check under which we create subsamples of firms in our dataset based on firm size and age and test that our results are consistent. Splitting the dataset into small/large and young/old firms, whereby all firms below the median size or age are classified into small and respectively young firms, creates the subsamples. All regression results are found in Appendix B, while the robustness checks are in Appendix C.

It is worth mentioning that within our models and proxies for bank health the injunction variable reflects an unhealthy bank whereas a higher Z-score will reflect a healthier bank, due to the lower probability of default.

Firm Capital Structure results:

3.3.1 Hypothesis 1: Leverage

In Table 3 we have the results obtained from regressing $Leverage_{it}$ on the first and second lag of the Z-score for banks to uncover the timing of the effect of bank health on firms. This approach is adopted for all dependent variables.

Model (1) reports a significant decrease in firm leverage by 0.702% as the banks' Z-score increases by 1 with a p-value of 0.07 and represents an inverse relationship to leverage from what we have hypothesized. Model (2) shows that the effects of bank health are not significantly correlated with firm leverage after 2 years and remains insignificant even after including firm characteristics, and though it exhibits the expected relationship it will not be further included within our models. Thus, the specification using the first lag is preferred, and is used throughout the rest of the models. In model (3) control variables for firm characteristics are included, which significantly increases the explanatory power of the model and decreases the point estimate of bank health to 0.682%, whereas model (4) incorporates both firms and bank controls. Adding the bank controls slightly increases the explanatory power of the model as evidenced by the larger R-square and increases the effect of bank health to a coefficient of 0.737% and an increased significance at 5 %, and will represent our preferred specification.

Firm characteristics are all significant and with the expected sign, with the exception of firm ROE and size. The size coefficient has the expected relationship to leverage and is significant only at 39.8%. Firm ROE however has the inverse sign as to what we would expect, however the coefficient is highly insignificant with a 90% likelihood of it being 0.

Initial robustness checks in Table 17 show that our original results are indeed consistent in sign throughout the subsamples, though the significance diminishes. The diminishing significance may be attributed to the decreased number of observations for each subsample and is to be expected. Given our hypotheses predicted an increase in leverage for healthier banks, and thus a positive relationship between bank Z-score and Leverage, as the basis for seeing effects in all the other firm outcomes, we implement additional checks to ensure the inverse relationship is not driven by the period used. We thus regress leverage on the same independent variables for each individual year from 2009 to 2013 and observed that the negative effect persists throughout the years, except for 2010 where the effect turns indeed positive, however its high insignificance deems it to be 0. We thus conclude that the initial negative relationship between bank Z-score and firm leverage is robust.

The second regression series, which uses the injunction status as the proxy for bank health, is seen in Table 4. The approach adopted for these models resides in the successive addition of the injunction status and its first and second lag to reveal when the effect of the exogenous shock is transmitted to the firms through the dependent variables studied during 2010 - 2012. In models (1), (2), (3) the injunction status shows that firms with injunction banks had a 4-4.9% lower leverage than firms with non-injunction banks for 2010 which is consistent with our hypothesis and other research. The effects of the shock to the banks are reflected in firms' leverage levels in 2011 also, as leverage is lower by 3.8% for the corporate customers of the injunction-banks in Model (2). Adding the second lag in Model (3) shows that having a bank in 2012 that had an injunction in 2010 still results in a lower leverage for firms, though the effect is no longer significant. We therefore assess the effect in second year to be no longer present and we pursue our analysis with Model (2), where we add firm characteristics. The size, the interest expense, probability of default as well as the age of the firm all maintain the significance level, very close point estimates and the expected relationship with leverage as described for the models using the banks' Z-score. Return on equity has p-values of around 0.9 also here so its effect on leverage overall is not significant. Controlling for firm effects, injunction remains significant at 1% with a consistent coefficient, while the lag of the injunction status is no longer relevant in explaining firm leverage so it is not used further on. Bank control variables are added in Model (5) where the point estimate for the injunction status increases slightly to 4.86% and will represent our preferred specification.

Robustness results seen in Table 18 confirm our initial findings, showing a clear significant impact over all subsamples with a slightly higher impact on larger and old firms. We thus conclude the results are robust.

3.3.2 Hypothesis 2: Interest Expense

Table 5 documents our results on the effect of the bank's Z-score on firm's interest expense, which contains all the interest paid by a company as a percentage of its total debt carried on the balance sheet. The construction of our model follows the same pattern as outlined above and within the model specification section. Model (1) shows a significant reduction in interest expense of 4.96% as the bank health improves by 1, which is the inverse relationship of what we expected within the hypothesis. The second model uses the second lag of the Z-score and reveals an insignificant effect, thus leading us to continue with the first lag of the Z-score. Firm characteristics are added within Model (3) which considerably improve the explanatory power of the model as judged by the adjusted R-square, whereas

the point estimate for the Z-score maintains significance, its effect is slightly lower. Model (4) sees the addition of bank controls, accounting for bank risk, which further improves the model's ability to explain changes in firm interest expense. Accounting for both firm and bank controls the point estimate for Z-score decreases even further and becomes insignificant, though retaining a rather low p-value of 0.15.

Firm characteristics all exhibit a significant effect, reflecting their importance in explaining changes in interest expense with ROE and Z-score showing the expected negative sign while age and size exhibit the opposite effect from what we have expected to see.

Robustness checks (Table 19) revealed the inverse effect of bank Z-score on interest expense is indeed consistent throughout our subsamples, though mainly insignificant it retains the inverse sign, with older and larger firms commanding an even larger increase in interest than smaller, younger firms.

The injunction model, reflected in Table 6 reveals a significant point estimate of 28.1% only for the first year post receiving the injunctions, while the other years exhibit highly insignificant results. The increase in interest expense post the injunctions is as expected, and adding firm characteristics to Model (4) increases the explanatory power, while slightly decreasing the point estimate to 26.1%. Model (5) represents the complete model with both firm and bank controls and with the highest explanatory power and our preferred specification. Within this model the injunction variable exhibits a highly significant 24.1% increase in interest expense one year after receiving the injunctions.

Firm characteristics maintain their significance within the injunction model as well, while the signs of the coefficients are the same as observed under the Z-score model, which further indicates these are indeed robust.

In terms of the robustness check for the injunction model, the observed effect persists throughout our subsamples as seen in Table 20. While the effect of the injunction is still significant, it has lost part of its significance, we suspect, due to the decreased sample size. The robustness checks further uncover that small and older firms are more susceptible to a increase in interest expense following an injunction received by their primary bank.

3.3.3 Hypothesis 3: Cash Holdings

Investigating the effect of bank health through the Z-score proxy on cash holdings as the dependent variable in Models (1) and (2) in Table 7 we do not see a significant relationship. Thus, the addition of firm controls is pursued and results in Model (3)'s significant point

estimate of -0.0787% for the first lag of the Z-score which means that, indeed, unhealthier banks cause firms to increase cash holdings relative to their assets, which is in line with our expectations. The second lag proved to be insignificant and thus was dropped from further analysis. The explanatory power of the model is further improved by adding bank control variables, within model (4), arriving at our preferred specification. The point estimate for the Z-score now lies at 0.0853% slightly higher than our previous results.

In terms of firm characteristics, all variables are highly significant and in line with expectations with the exception of firm age which exhibits the right sign but the coefficient is only significant at a p-value of 0.59.

Robustness checks in Table 21 have identified a consistent result for the direction of the relationship for all the subsamples, however, the significance is lost, we believe, due to the lower number of observations included. For the large subsample, however the effect of a higher Z-score on firm cash holdings is indeed significant, which may be due to the fact that it has the highest number of observation within the subsample. As seen from the table, the higher the number of observations included in the subsample the lower the p-value becomes and closer to significance at a 10% level. We thus conclude that the results obtained through Z-score method are robust.

In Table 8 the first three models suggest that the injunction status and its two lags are not capable of explaining firm cash holdings on their own. The addition of firm variables renders the second lag of the injunction status as significant at a 10% level and as predicted, firms whose banks received injunctions do in fact increase their cash accumulations but only two years later.

With respect to the firm variables in Model (4), they all maintain the significance level observed in the previous models using Z-score with very similar point estimates. Adding bank controls in model (5) further improves the model's explanatory power as judged by the adjusted R-square and uncovers a slightly higher point estimate of the injunction status two years after the event at 2.7% increase in firm cash holdings.

Robustness checks in Table 22 show a consistent direction of the relationship between the injunction status and cash holdings at firm level for all our subsamples. While the significance is lost for the large and older firms the significant result for small and young firms confirms our expectations of these subsamples being more affected by the health of the bank than larger, older firms. We thus conclude that the results obtained through the injunction model are indeed robust.

3.3.4 Hypothesis 4: Issued Equity

Regressing bank health through the Z-score proxy in models (1) and (2) in Table 9 we do not see a significant effect though the relationship is negative as expected. Firm controls are added to the first lag as it has a lower p-value and further add on bank controls. All the firm predictors exhibit the wrong sign relative to expectations, and only firm age is significant in Model (4) yet at a 0.099 p-value. With p-values over 0.8, the impact of tangibility and size are close to 0.

The robustness checks reveal the Z-score maintains its effect for all sub-samples except for old firms (Table 23).

When bank health is estimated through the injunction status and its lags, the results are seen in Table 10. Not seeing a significant timing of the impact of the injunction, all three variables are kept when adding the firm characteristics and the bank controls. The injunction has a negative effect of 0.05% on issued equity in 2010, 0.5% in 2011 and 0.04% in 2012 though not significant. Throughout the models, the injunction results in inconsistent effects on issued equity, which is why initially the results are not considered robust.

Firm age, profitability, the firm Z-score and total assets have opposite signs than the expectations set out in the hypothesis, with tangibility being the only one meeting the supposed relationship.

Testing the model on sub-samples further perpetuates the lack of robustness of the injunction measure on issued equity when neither of the lags or the 2010 injunction status behaves as expected throughout the sub-samples (Table 24).

Firm Growth Results:

3.3.5 Hypothesis 5: Investments

The effect of bank health measured through the Z-score on their borrowers' investments is studied in Table 15. The first two regressions with only bank health as predictors yield a negative explanatory power and the second lag does not have the expected sign. Thus, firm variables are introduced with the first lag and then bank controls in Model (4). All the firm characteristics fulfill the expected relationship detailed in the hypothesis with the proxy for cash flow being the only one having a significant effect. In the preferred model, investments grow by 2.01% as the Z-score for the bank increases by 1, though the effect is not significant.

Testing these results on small/large and young/old sub-groups we find the expected results for large and old firms (Table 29).

When attempting to explain firm investments using the injunction status in Table 16 we still do not see a significant relationship. Keeping all three injunction variables and adding the firm and bank characteristics we obtain Model (4). Borrowers from injunction banks have higher investments in 2010 by 2.61%, higher investments in 2011 by 1.34% but the expected effect of lower investments in 2012 by -11.7%. Though neither are significant, the second lag has the lowest p-value of 0.185. The firm characteristics have all the expected signs, except for firm age, whose effect is close to 0 given its very high p-value. And the size of the firm and the proxy for cash flow are significant

The robustness analysis renders the model not relevant in explaining the firm investments relative to the primary lenders' health as contradictory signs are found for the injunction variables across the sub-samples (Table 30).

3.3.6 Hypothesis 6: Firm Growth

When regressing bank health using the Z-score on the change in assets the results are seen in Table 11. While the first lag has the expected sign, it is not significant. The second lag however exhibits a significant effect on assets with a 2.6% yearly contraction when the Z-score increases by 1. Including firm variables in Model (3) we see a lower explanatory power and the effect of bank health is no longer significant. Among the firm variables, only the age of the firm has a significant effect and it is negative as expected, its point estimate has a value of -0.0283. The proxy for cash flow and number of employees are not significant and have opposite signs than expected. Leverage has a negative effect on the change in assets, but is not significant. The addition of the bank controls results in a negative adjusted R-square and none of the newly added controls have a significant effect on the dependent variable.

The robustness checks for this model (Table 25) included only the second lag, as that was the preferred model using the Z-score. The effect is consistent across the sub-samples with a stronger impact on small and young firms, as expected.

Using the injunction status, we see the expected negative relationship with asset growth and that the strongest effect is from the second lag. Thus, in Model (12) when firm controls are added, only the second lag of the injunction measure is included. The firm variables behave as seen in the Z-score regression and increase the explanatory power of the model. In the

final and preferred specification, the injunction results in a 6.3% contraction in asset growth, while the bank controls add little value to the overall model.

When these results are tested for robustness in Table 26, we see a significantly stronger effect on smaller firms of -16.6% asset growth for injunction borrowers and a -10.1% effect for young firms. Large firms have a positive growth in assets by 1.1% given their bank had received an injunction, while older firms incur a reduction in the asset base of 5.4%.

The change in full-time employees is regressed with the first and second lag of the Z-score in Table 13 and we observe the expected negative relationship with a lower p-value for the second lag, which is added to the further models. Model (3) sees the inclusion of the firm characteristics and in the last model bank controls are added. Keeping the expected sign, the coefficient for the Z-score implies a 0.05% reduction in the number of employees yet is not significant. All firm characteristics exhibit the expected relationship, with only the firm age having a significant role in explaining employee growth.

The robustness checks further demonstrate the low explanatory power of the Z-score for employee growth as the coefficient direction is inconsistent with a negative relationship for large and young firms and positive for small and older borrowers (Table 27).

The models using the injunction status seen in Table 14 confirms expectations as well showing that unhealthier banks lead to a contraction of employee growth. Seeing that neither of the injunction variables are significant, all three are kept when the firm and bank controls are added. Thus, we end with Model (5) where in 2010 employee growth is reduced by 4.72%, in 2011 by 2,48% and in 2012 by 0.09% for injunction borrowers. However, these effects are not significant either. The firm and bank controls behave as seen in the Z-score regressions.

The robustness analysis yields that only the first lag of the injunction status maintains the expected relationship throughout the sub-samples, while the other two forms of the injunction status are inconsistent, thus we conclude that the results are not robust (Table 28).

5. Discussion

Within this section we will discuss the empirical results in the context of each hypothesis and prior empirical work. We will address our findings from the perspective of what we were expecting to see and what theory and prior research has uncovered. The section will be divided between firm capital structure effects and firm growth effects and further parted into each hypothesis.

Firm Capital Structure Effects:

5.1 Bank Health and Leverage of Borrowing firms

Our first hypothesis related bank health and leverage and stated that: *There is a significant relationship between bank health and the debt levels of borrowing firms. Firm's debt levels should be lower for customers of a less healthy bank.* Our results for each measure show a contradictory impact of bank health on firm's leverage and thus warrant a separate discussion.

The injunction measure of bank health portrays a strong significant reduction in firm leverage during the first year of the injunctions, which is in line with previous research (Jensen Lærkholm 2015). The findings entail that banks faced with regulatory pressure to implement measures to increase their health, resort to credit rationing. The results are robust throughout both small/large and young/old firms with a slightly higher decrease in leverage at large and old firms, which comes in contrast to previous studies where banks' credit cuts tend to have higher impact first on firms with the highest informational asymmetries (young, small firms) (Iyer et al. 2014). However, small, young firms may still exhibit a larger effect on the other studied firm outcomes as they may be less able to compensate for the reduction in credit supply compared to larger, older firms. The significant results also reflect that firms were not able to fully substitute the decrease in credit supply from their primary lender with borrowing from secondary lenders or by recurring to public debt markets. This offers an increase motive for analyzing the remaining firm outcomes in order to uncover whether the effect was substituted through internal funds or issued equity and whether this effect has further repercussions on firm growth.

Within the Z-score proxy for bank health, the one-year lag of the measure exhibits an inverse significant relationship to leverage as to what we would expect. Thus the measure entails that a less healthy bank would increase borrowing with 0.7% compared to a healthier

bank and contrasts previous research (Chodorow-Reich 2013). This behavior seems more in line with what an unhealthy bank would exhibit before the financial crisis period, where they would be more prone to an over-lending behavior (Yamada 2013). Robustness checks have uncovered that the effect is consistent among small/larger and young/old firms. In an attempt to explain the contrasting relationship we implemented checks to uncover whether our hypothesis may stand true only for the years during the financial crisis with a reverse effect in the later years of our sample when unhealthy banks would return to their over-lending behavior. The inverse effect, however, persisted throughout all the years, as seen in Table 31. When examining the two-year lag of the measure the sign turns positive, which is consistent with our initial hypothesis and implies that a customer at an unhealthy bank would reduce leverage more than customers of healthier banks. The result is consistent throughout the years, with the exception of 2012 where it is close to 0. However its lack of significance leads us to conclude there is no observable effect on firm leverage stemming from its primary bank's health two years prior, but that there is a positive effect on leverage from being the customer of a bank whose health was poorer the previous year.

Given that the models we employ for both measures are identical and that the results uncovered through the injunction method confirm and are aligned with previous research on the effect of bank health on firm leverage we assess that the contrasting results obtained with the Z-score measure pertain to the limitations of the method outlined within the identification strategy. The inability of the measure to fully grasp the uniqueness of a bank when it was not specifically designed to assess financial firms as well as its backward looking characteristics may have indeed diminished its ability to portray the health of banks. Furthermore, the lack of a clear identifying strategy as well as its increased sensitivity to changes in bank health, due to its classification of soundness along a continuum, might have diminished the impact we see on firm outcomes. The limitations paired with our contrasting results lead us to deem the measure unable to fully portray bank health effects on borrowing firms' leverage. Analyzing the rest of firm's outcomes is still warranted as to uncover whether this is an isolated consequence pertaining solely to firm leverage, or whether the results are consistent throughout the rest of the models.

Firm characteristics confirm previous research undergone on what drives firm capital structure decisions (Rajan & Zingales 1995). To this end, firm size, despite the ambiguity in explaining the source of the effect, shows a positive correlation to leverage. Interest expense, as a proxy for tangibility, is negatively correlated to leverage, which implies that companies with more tangible assets, which command a lower interest expense, are able to

borrow more as they use the tangible assets as collateral. Profitability, however does not exhibit any relationship to firm leverage, which comes in contrast to Rajan and Zingales' research. Profitability is a proxy for firm's availability of internal funds and a higher profitability, drives lower leverage as companies fund investments through profits earned as opposed to debt. Our insignificant results may stem from our proxy for firm profitability, which we calculate as firm return on equity (ROE), while previous work classifies profitability by firm sales or growth in sales. Measuring sales would provide a better view of the firm's actual availability of internal funds as opposed to return to shareholders. ROE may also be influenced by changes in book value of equity and not necessarily reflect the profitability of the company, as we have seen within the data description part where ROE has considerable more variability per year than firm profits which imply large variability in shareholder equity. However, due to lack of company sales' data we recurred to using ROE as proxy for profitability. We thus deem the insignificant result obtained for profitability to be due to the imperfect substitute for profitability used within our models.

Firm age is found to have a negative impact on leverage, in line with Pfaffermayr et al. (2013) research and pertains to young firm's inability to finance investments through internal funds and which have a more limited access to equity financing and would thus recur to more debt financing.

The Z-score for the firms was added to the model as a proxy for the firm's bankruptcy costs as a firm with a lower Z-score, a higher probability of default, would have access to less financing and would command a higher external finance premium when it did borrow, due to the decrease probability of repayment the banks would face. However, our results show a negative correlation between the firm Z-score and its leverage, which can be explained by firms with higher Z-score being more conservative with their debt financing.

Concluding, our findings from the injunction measure can affirm our hypothesis of a significant negative impact of unhealthy banks on firm leverage, whereas the Z-score approach cannot confirm nor refute this hypothesis.

5.2 Bank Health and Interest Expense

Our second hypothesis connects bank health to the interest expense paid by borrowing firms stating that: *There is a significant relationship between bank health and the interest expense of borrowing firms. Firm's interest expense should be higher for customers of a less healthy bank.*

Once again the injunction and the Z-score methods pose contradictory results and therefore warrant a separate discussion.

Within the injunction method there is a clear significant increase in the interest expense paid by the borrowers one year after the injunction is received. This illustrates that unhealthy banks, faced with regulatory pressure to increase their health status, would first recur to credit rationing, as seen from the decrease in leverage during the first year, followed by an increase in interest rates. These results confirm Hubbard et al. (2002) research of unhealthy banks charging higher interest rates than healthier banks. Interpreted in a different way these results may also provide evidence of how banks receiving an injunction react to the shortfall in their minimum capital held. Thus, as outlined within the literature review, banks may issue new equity to satify the injunction requirement. If there are frictional costs associated with new equity issuance (Myers & Majluf 1984) or the bank's cost of funding would increase due to tax advantages of debt and implicit government guarantees (Brunnermeier & Pedersen 2009), these higher costs may be passed over to borrowing customers through an increase in interest rates charged on loans and may offer a potential explanation for the hightened interest expense experienced by borrowers from injunction banks.

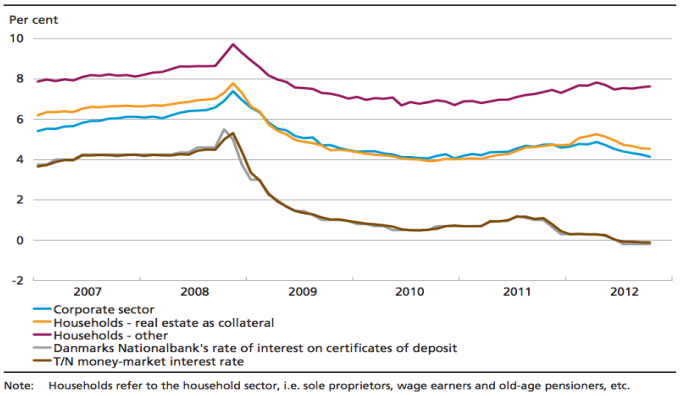
Another potential explanation relates to other sources of financing used by firms. An important note is that the interest expense examined here represents the interest paid by firms on all their borrowings and not solely on the borrowings from their primary bank. Therefore, the increase in interest expense may not occur merely due to the firm's primary bank raising interest costs. Firms faced with rationed credit from their primary bank may search to compensate with funding from either secondary lenders or public debt markets, where they might face an increase in funding costs. The increase in costs of funds may arise due to firms becoming informationally captured by their main relationship bank and having a difficult time conveying information about their superior performance to other lenders (Sharpe 1990). Should borrowers fully compensate for the reduction in credit from their primary bank with borrowings from other lenders or public debt markets, we would not see any significant impact on firm's leverage. However, since an impact is indeed observed, we argue that only part of the reduction in credit might have been compensated with other, more expensive borrowings, which could have driven the effect seen in interest expense.

The results are robust for our sub-samples of small/large and young/old firms with the largest effect being experienced by small firms. This can be explained by the increased informational asymmetries faced by small firms, compared to large firms, and through the

more established market position of large firms, which increases their credit worthiness and thus lowers their interest expense. Facing an increased interest expense may further impact firm outcome in terms of growth and investment where projects previously deemed profitable, become unprofitable due to the new funding costs.

Looking at the results uncovered by the Z-score proxy for bank health, we observed an insignificant positive effect between a bank's health and its interest expense, entailing that an unhealthier bank would charge lower interest than healthier banks. This behavior seems aligned with what an unhealthy bank is expected to exhibit, as it would be consistent with their over-lending behavior prior to a financial crisis. The results are robust throughout our size and age subsamples, persisted throughout all the years (Table 32) and are consistent with the results on leverage uncovered by this measure. The outcome, however, contradicts previous research that unhealthier banks would reduce credit supply more and charge a higher interest rate than healthier banks, after a shock to the financial sector (Chodorow-Reich 2013, Hubbard et al. 2002). Once again, the models employed for the injunction and the Z-score method are identical, leading us to believe that the contradictory result exhibited by the Z-score method pertains to the weaknesses of the measure discussed previously.

In terms of firm characteristics, profitability and the firm's Z-score confirm that the interest is driven by the creditworthiness of the borrower, as a more profitable firm with lower probability of default, commands a lower interest rate. Firm age and size, however, reflect opposite effects as to what we would expect. Due to higher informational asymmetries, small, young firms are expected to pay a higher external finance premium, as their position on the market is not as well established and known by the market. Our results however, reflect a higher interest rate commanded by older and larger firms. A potential explanation of why larger, older firms demand higher interest rates could emerge from our computation of the interest rate variable. The variable used is calculated as the interest expense reported by the company on their income statement, as a percentage of the firm's total debt and it comprises both debt from primary lenders and other forms of financing as well as new and old loans taken by the company. Including old loans within the computation might be the cause of bias for larger, older firms, which may have a greater portion of older debt on their balance sheet compared to younger and smaller firms. As we can see in Fig. 33, prior to 2009, the average interest expense on outstanding bank loans to corporate sector was higher than the interest charged post 2009. Hence, having a larger amount of old loans on the balance sheet can drag the overall interest expense paid to the higher end compared to peers with fewer old loans.



Note: Households refer to the household sector, i.e. sole proprietors, wage earners and old-age pensioners, etc.

Figure 33 Average interest rates on outstanding bank loans
Source: Liltoft Brian, Kramp Lassenius Paul K 2012

Table 2 Interest for Small, Young Firms

VARIABLES	InterestExpense
Small	-0.101**
	(0.0410)
Young	-0.188***
	(0.0404)
Observations	7,233
R-squared	0.016
Industry FE	YES
Region FE	YES
LegalForm FE	YES
Firm FE	YES
Adjusted R-squared	0,088194444

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The bias of larger, older firms paying a higher interest expense is evidenced in our dataset as well, as Table 2 shows significant results for small, young firms paying significantly less in interest compared to larger and older firms.

We thus conclude that our findings using the injunction model provide evidence that supports our hypothesis that customers of unhealthy banks would pay higher interest rates compared to customers of healthier banks, while our findings using the Z-score measure cannot affirm nor refute this hypothesis.

5.3 Bank Health and Cash Holdings

Our third hypothesis pertains to bank health effects on cash holdings for their borrowers and it states that *there is a significant relationship between bank health and the proportion of cash holdings of borrowing firms. Firm's cash holdings should increase for customers of a less healthy bank.*

The Z-score of the bank has the expected negative relationship with cash holdings, denoting that as the health of the banks improves, the less cash firms accumulate. As firms should be able to rely on debt funding from banks that were not in a poor state during and after the financial crisis, they would not pursue holding on to cash, which is the case for borrowers from unhealthy banks.

However, given that we have seen the opposite effect on the leverage of companies in the Z-score models we cannot infer that holding more cash was done to compensate for reduced debt funding. Nonetheless, even without seeing that lending was reduced, we do observe an

increase in cash holdings for firms, albeit only a 0.85% change in cash relative to total assets as banks' Z-score decreases by 1.
To grasp a better understanding of the causes of increased cash holdings we revert to the precautionary motives outlined in the research of Bates et al. (2009). When access to capital markets is scarce or expensive, firms with high information asymmetries and few tangible assets to offer as collateral would accumulate more cash.

However, given that we do not observe scarcer or more expensive credit conditions for firms borrowing from unhealthy banks, a potential explanation might come in terms of unobserved loan requirements. If firms experience an increase in these unobserved requirements, such as an increase in collateral demanded, which does not yet hinder their ability to borrow, but may raise firm expectations for future credit terms tightening, this may be sufficient for firms to slightly increase their share of precautionary cash savings. As such, increased unobservable loan terms would not be reflected in either leverage levels, supposing firms are still able to meet the new requirements and maintain the same level of borrowing, nor in the interest rates paid by firms, but might lead companies to save more cash in expectation of future credit term tightening.

Furthermore, the effects of bank health on firm cash holdings become more pronounced when an exogenous shock to lenders takes place. Notwithstanding that the injunction was a shock to only specific banks, an increase in cash relative to total assets of 2.7% in 2012 shows a stronger effect than what was observed in the regressions using the Z-score for a one period change in the level of cash holdings.
As expected, banks that were required to increase their capital resort to reduced lending which was confirmed in the effects on leverage and that entails a larger amount of cash being held by the firms to offset this effect.

With respect to firm effects, all our expectations are confirmed by the results. Firms with more collateral are expected to have better access to funding and would hold less cash for precautionary motives, which is true for the firms in our sample.
The effect of leverage on cash holdings has proven to be a discord in previous studies. Our results support the findings averred by Ferreira & Vilela (2004) and Caldeira & Loncan (2013) which imply that internal funding is preferred and firms resort to debt only when running short of cash. The negative relationship between leverage and cash holdings

confutes the theory that higher leverage leading to increased probability of default causes firms to accumulate cash (Ozkan & Ozkan 2004).

Younger and smaller firms were expected to rely more substantially on cash holdings and our results confirm these findings as well as the usefulness as predictors of firm age and size (Hadlock & Pierce 2010).
The robustness analysis as well confirms a significantly stronger effect on smaller and younger firms within the sample in the models using the injunction. With the health of the bank estimated through the Z-score, we find the results robust, yet with a significant effect only on large firms.

To put our results into context, we revert back to the discussion on the *"flight to quality"*, outlined in the literature review, which contended a reallocation of bank loan supply towards large firms by disrupting lending to smaller ones. As smaller firms tend to rely more heavily on internal funds and face more informational asymmetries in the relationship with their bank, they are more prone to bank health effects on cash holdings, which was seen in the injunction analysis.
The importance of cash holdings for firms stands mainly in their ability to fund projects and sustain growth. Having confirmed that firms do offset the reduced lending to a certain degree by increasing their cash holdings, whether this is sufficient to fund growth and mitigate the effects of a bank's injunction will be discussed further when looking at investments, assets and employees.
Finally, we arrive at a confirmation of our third hypothesis and a noteworthy result to our contribution in the study of bank health on firm effects and more specifically, on cash holdings.

5.4 Bank Health and Issued Equity

After studying the effects of bank health on firm debt and internal funds, the last investigated component of capital structure that may have been impacted by bank health during the period examined is new equity.
Our hypothesis pertaining to equity states that *there is a significant relationship between bank health and borrowing firms' new equity issuance. New equity issuance should be higher for customers of a less healthy bank.*

Within the model using the Z-score estimation we do not see a significant relationship of bank health and issued equity. Although the point estimate confirms that as the health of the bank improves, firms issue less equity, which is as expected according to the literature reviewed, the effect is not material and not significant. The overall negative adjusted R-square for all models using either the first or second lag of the banks' Z-score implies that this proxy of bank health has no explanatory power on the amount of new equity issued by firms.

Taking into consideration our previous findings on leverage and cash holdings, the lack of a significant effect on issued equity does not bring compelling evidence on the effects of bank health on new equity as much as it justifies the weak explanatory power of Z-score on firm capital structure.

While we have found significant results for the effect of bank injunctions reducing lending and causing increased cash holdings, we do not see a significant relationship for issued equity. Once again, the sign confirms expectations, while the overall explanatory power of the model is negative.

With respect to the firm characteristics, though most do not have a material effect on issued equity, their signs contradict the expected results and reduce even further the explanatory power.

Firm age has a negative relationship with issued equity in both models, which is contrary to the expectations that younger firms with higher information asymmetries would have less access to equity issuance (Pfaffermayr et al. 2013). However, given that it is not significant and that the robustness analysis does not hold we cannot confirm that the results of the firm age are notable.

The proxy for bankruptcy costs, profitability and firm size exhibit opposing relationships than what was expected, but the coefficient determines practically an effect of 0 on issued equity and thus further decreases the explanatory power of our models.

Tangibility confirms expectations with respect to its negative relationship, implying that having less collateral will make it more difficult to obtain credit, driving firms to resort to new equity issues to fund their operations. While having the right sign, tangibility does not pose a significant effect.

The empirical work driving our hypothesis and expectations must be discussed to understand the divergences between what others have researched (Dwenger & Fossen 2015) and our own findings.
Being faced with a shortage in credit, firms would compensate mainly through cash holdings (49%), dividends (46%) and only lastly new equity (5%), nonetheless, all these internal funds would amount to only 48% of the debt reduction. (Ibid.) The primary method of compensating for credit shortage was confirmed by the results of the cash holdings analysis, whereas further investigation revealed there was no increase in either new equity or dividends.

The implications of not seeing a compensation of reduced debt funding through equity make it in itself a noteworthy result. If firms were able to perfectly substitute the loss in credit, then the effects of bank health would be limited to changes in the capital structure composition. While we have found that an injunction causes reduced leverage and increased cash holdings, yet no increased equity, we would assume that in turn the overall funding available for growth and operations for firms was contracted.

This effect gives further motivation to pursue an analysis of firm growth to uncover the extent of the impact of bank health and identify the measures taken by firms to cope with the reduced funding capabilities. If this analysis would have concluded that there was no distinguishable effect in firm growth relative to bank health, it would be compelling evidence to further investigate the mechanisms of corporate financing that took place to mitigate the effect of bank health. However, our results have shown that we see a significant effect of the injunction on banks causing a contraction in firms' asset growth, thus the discussion turns to assess these results.
We can therefore conclude that our results cannot affirm our fourth hypothesis that new equity issuance should be higher for customers of unhealthy banks.

Firm Growth Effect:

5.5 Bank Health and Investments

Our hypothesis linking bank health and investments states that *there is a significant relationship between bank health and borrowing firms' investments. Investment should be lower for customers of a less healthy bank.* Our results do not show a significant impact on investments, neither using the injunction measure nor the Z-score measure. While the sign

of the coefficients initially provide support for our hypothesis, when testing for robustness we observe an irregular relationship direction that indicates we cannot rely on the initial direction of the effect observed throughout our baseline models. These results would lead us to believe there is no observable impact of bank health on firm investments.

Using the injunction method we would have expected to see a decline in investments throughout one of the three years studied, following the 4.9% decrease in leverage in the first year for firms borrowing from injunction banks. Our findings of no material impact on firm investments from the 2010 injunctions are in line with previous research done on firm growth effects of bank injunctions (Jensen Lærkholm 2015). The lack of an effect on firm growth has been argued to be caused by firms compensating the decrease in leverage through an increase in equity. Our findings indicate that firms borrowing from an injunction bank did not compensate the credit rationing through an increase in issued equity, deeming the potential explanation improbable. However, within our results we found evidence of a strong significant relationship between a firm's cash flow and its investments, explaining 62% of firm's investments. Furthermore, firms borrowing from injunction banks increase their cash holdings with 2.7% driving firm's increased liquidity. Thus as stated within our hypothesis, firms may offset the external financial constraints by relying more on internal funding such as cash flow and liquidity, for which our results present favorable evidence for. The ability of firms to compensate for the external financial constraints posed by their injunction bank by the use of internal funds could explain our findings of no material impact of bank health on borrowing firm's investments.

Using the Z-score measure to establish the health status of a bank also uncovered an insignificant impact on firm investments. This result comes in contrast to our hypothesis, but in line with our expectations following our findings on firm leverage. The Z-score measure found that unhealthy banks continue their over-lending approach causing an increase in firm's leverage the following year for those borrowing from a less healthy bank. Bearing in mind these results, we wouldn't expect to see the negative impact of bank health on firm investments as firms do not appear to be financially constrained by their unhealthy bank.

With respect to firm characteristics, within the Injunction model, cash flow, profitability and cash holdings show a positive relationship with investments, reflecting both the availability of internal funding as well as firms potentially facing external financial constraints and relying more on cash flow to fund investments. These results support previous research on firm internal funds' sensitivity to investments (Ogawa 2013). While

we observe roughly the same relationships within the Z-score model, the exception comes in the effect exhibited by cash holdings, which shows a negative relationship to investments. However, the high insignificance of the coefficient sets its value close to 0 and thus we maintain that our observed relationship of cash holdings on investment, neither confirms nor contradicts research on firm liquidity and investments (Ogawa 2013, Fazzari & Pettersen 1993).

Leverage's negative relationship to investments confirms previous empirical work (Ogawa 2013). Higher leverage reflects an increased risk of default for the firm, which will demand a higher cost of external finance and cause certain profitable projects to be rendered unprofitable due to the increase in funding costs, thus lowering investments.

Firm size and age are used as proxies for firms more likely to face informational asymmetries (small, young firms) and thus more vulnerable to external financial constraints (Hadlock & Pierce 2010). Firm size confirms this relationship within our results, showing that larger, more established firms are able to invest more due to their reduced asymmetric information. However, firm age seems to evidence a negative correlation between age and investments rendering younger firms to invest more. Younger firms, however, have a short history and are less known in the market and thus should face higher external financial constraints. While our results seem to contradict the common view that young firms are more financially constrained and thus exhibit less investments, they are in line with research showing that younger firms grow at a faster rate than older firms (Haltiwanger et al. 2013, Storey 1994). The lack of significance we attain in our results is also aligned with Ogawa (2013), who find that firm age is not directly associated with external financial constraints in developed countries.

Considering that our findings come in contrast to the original empirical work on which we based our hypothesis (Fukuda et al. 2005, Ma et al. 2011), who uncovered a negative relationship between bank health and firm investments, it is important that we identify the potential differences within our empirical work which might have driven our contrasting results. Beyond the differences in identification strategies and our proxies for bank health, which may have driven differing results, one notable deviation is the inclusion or exclusion of Tobin's Q measure. Tobin's Q is a proxy for the investment opportunities faced by a company and is calculated in its classic form as total market value of firm divided by total asset value or replacement cost. The larger the ratio, the more investment opportunities the firm faces. This measure is a standard explanatory variable in literature describing firm investments and under the assumption of perfect capital market, would be the only

explanatory variable needed in examining the level of investments (Ibid.). Our inability to source market values for the companies within our dataset has led to our decision to exclude Tobin's Q from our models. However, given its importance evidenced in prior empirical work, our models might be suffering from omitted variable bias and thus given rise to the insignificant relationship observed between bank health and investments.

We can therefore conclude that our findings cannot confirm our fifth hypothesis of a significant negative relationship between bank health and firm investments and will turn our attention now to whether firm's real growth in terms of assets or employees has been in someway impeded by bank health.

5.6 Bank Health and Firm Growth

Lastly, to conclude the discussion of our results we turn to the analysis of firm growth. As the capital structure models revealed that there was a decrease in firm leverage, yet to a certain degree counteracted by higher cash holdings in the aftermath of bank injunctions and no observable effect on firm investments, we focus our attention on assets and employees as measures of real growth.

As put forth in our sixth hypothesis we asserted that *there is a significant relationship between bank health and borrowing firm growth. Firm growth should be lower for customers of a less healthy bank.*

The regressions on employee growth do not show a significant impact of bank health, albeit we see a contraction of employment levels in the models using the injunction status, which supports our hypothesis, the relationship with employee growth is not significant. The models using the Z-score do not bring significant results, although they do meet the expectations based on previous research with respect to seeing a fall in employment due to unhealthiness of the firms' lender.

However, the relationship denotes a decrease in employment levels in 2010 of 4.72%, 2011 2.48% and 2012 0.88% for the firms whose banks received injunctions. We can see that the impact was strongest the year of the exogenous shock with diminishing impact the next two years. The fact that the effects are not significant may pertain to the sample size on which the analysis was performed. With only 826 observations for the preferred model, it is the smallest sample on which any of our hypotheses have been tested on and thus it may hinder our ability to see statistical significance for the bank health effects. Moreover, when checking for robustness, due to the subsamples used the number of observations is even smaller that the initial specification, further decreasing the reliability of the results.

To understand the implications of our findings, we turn to previous studies that did uncover the reduction in employment levels in relation to bank's effects.(Chodorow-Reich 2013, Gambini & Zazzaro 2013, Dwenger & Fossen 2015)
Noteworthy to observe is that we do reveal the same relationship with our dataset, without the significance of the effect and despite differing identification strategies and based on a considerably smaller sample.

With respect to the models using assets as the real growth effect for firms, we confirm our hypothesis by finding a 6.32% contraction in total assets for firms in 2012 whose banks received injunctions in 2010.As follows, the credit reduction that was observed in the first year following an injunction resulted in a reduction in asset growth the subsequent year, though potentially counteracted to a certain degree by increased cash holdings. The mitigating effect of higher cash accumulation was not sufficient to offset the reduction in credit and resulted with an adverse effect on firm growth.

The findings from the injunction model come to support the work of Jensen Lærkholm (2015) who uncovered a 3% reduction in asset growth for younger Danish firms with negative earnings. Given that we are able to capture the impact of the injunction in 2012 we see a magnified effect and across all borrowers from injunction banks.
Moreover, we have observed that the effects are indeed more pronounced on younger and smaller firms, in the robustness analysis, showing a stronger susceptibility of bank health onto their growth.

The results of the models using the Z-score measures comes in contrast with our expectations and the findings of the injunction regressions and previous empirical work, however it is in line with our findings on firm leverage and interest expense. As the Z-score measure identified unhealthy banks which are prone to an over-lending behavior compared to healthier banks and a lower interest charged for their loans, the results of an increase in asset growth for firms which borrow from unhealthy banks are to be expected, as firms have a greater availability of finance at lower costs of funds. However, the high insignificance exhibited by the model illustrates its inability to substantially explain changes in the asset growth of firms. Seeing that the injunction measure provides significant results, in line with previous research and that the models for both measures are identical, except for the proxy for bank health, we assess that the insignificance of the model using the Z-score method pertains to the limitations of the measure discussed previously. We thus assess the Z-score

model to be unable to predict potential changes in firm's growth in assets caused by bank health.

As for the firm effects included in the firm growth models, they are consistent across the employees and asset growth specifications, thus we will discuss them simultaneously.

The age of the firm is the only driver of growth that shows a significant effect with a negative relationship. This confirms previous studies stating that younger firms grow at a faster rate than older firms (Haltiwanger et al. 2013, Storey 1994).

The size of the firm, which is estimated through assets and respectively employees, exhibits the expected behavior according to Gibrat's law in that size does not determine the growth rate. What is more, conflicting signs across the models and high insignificance of the coefficient renders the effect of size close to 0 on explaining growth, further substantiating the effect rationalized by Gibrat.

Whether the firm has access to external funding or has a substantial reliance on internal funds to enable growth was studied by including further controls pertaining to cash flow generation ability and firm leverage. These controls account for the availability of internal and external financial resources, but do not bear significance in explaining the growth rate.

Positive correlation between cash flow and growth was found for the employee dimension and that can be interpreted as firms being financially constrained from an external funding perspective, recurring to more internal capital to fund growth (Fazzari & Petersen 1993). Contradictory sign than expected was found for the proxy of cash holdings on asset growth but its p-value sets its effect almost at 0, as more cash flow results in higher employee growth. A substantial debt overhang rendering firms in difficulty of obtaining additional funds for future growth or high levels of leverage are associated with slower growth which is the effect that we see, granting that it is not significant.

Finally, concerning the stated sixth hypothesis, we do confirm that firm growth is lower for customers of unhealthy banks. The expected relationship was found for both employees and assets in terms of injunction banks, though the effect on employee was not statistically significant. The Z-score, however, finds no significant evidence supporting the hypothesis.

6. Conclusion

Within the context of the development of the global financial crisis and its implications as well as the proliferating banking regulation, this paper set out to provide further empirical evidence on the transmission of deteriorating bank health onto their corporate customers by

attesting the dimension and magnitude of the effect. It accomplishes this by looking at bank health impact on firm outcomes in Denmark during the period of 2008-2013.

Guided by prior extensive research on transmission mechanisms pertaining to both bank and borrowers as well as existing literature on firm outcomes dependent on bank health we built our six hypotheses within the subjects of corporate structure and firm growth.

The empirical strategy rested on including firm characteristics as well as bank controls in the study of bank health in light of a rare empirical opportunity of regulatory capital injunctions, which enabled us to identify an exogenous credit supply shock independent of the borrower demand side. To account for the other years than 2010, we use a computed bank probability of default as an alternative measure of bank health in the study of the firm outcomes.

When looking at the regulatory measure of bank health estimated through the injunction status, our findings uncovered a significant effect of unhealthy banks impacting firm's leverage, interest expense, cash holdings and asset growth. Thus our results determined that unhealthy banks, forced by authorities to take measures to increase their minimum capital requirements, resort to curtailment of credit supply and pontential increases in the interest charged. These actions then result in 4.9% less leverage at the firm level, with companies not being able to fully compensate for the reduction in credit through other lenders and exhibit higher funding costs. Interest expense increases by 24% in 2011 for the borrowers from injunction banks. While no observable effect is seen on issued equity, we do see firms compensating through precautionary increases in their cash holdings of 2.7% relative to assets. No impact is seen on firm investments from an accounting definition of investments. However, firms who are customers of injunction banks in 2012 exhibit a clear contraction of firm growth of 6.3% in terms of assets.

The Z-score model uncovered that unhealthy banks pertained to their over-lending, low interest behavior even after the unfolding of the financial crisis in Denmark. This may stand as evidence that when unhealthy banks are not pressured by regulatory authorities to take measures to meliorate their health, will tend to continue with their unsound behavior, even post a period of financial turbulence in the market. Their practices lead to an increase in leverage and a decrease in interest expense for their corporate customers. While we have found evidence of a slight increase of 0.9% in cash holdings by firms relative to the unhealthiness of their bank, no other significant effect on firm outcomes has been identified.

Seeing its contrasting results and bearing in mind the limitations of the measure in fully capturing the health of the bank and its challenges in identifying the impact on firms' outcome, we deemed it not to be a conducive measure of portraying bank health effects on firms. We argue it was nonetheless the best accounting measure we could resort to as to supplement the injunction analysis and extend the research to 2008-2013.

While these findings contribute to the aforementioned body of work, our results should be understood in the context marked by the limitations faced by our research in terms of the inability to identify secondary or tertiary lenders or include injunctions received in other years. These limitations are potential opportunities for further research to divulge the depth and sharpness of bank health effects on the firm outcomes studied here or in additional areas where the impact may be observed.

To further elaborate on the implications of our results we turn to a reflection of the perspectives from which our research adds value and affords meaningful empirical evidence.

7. Perspectives

Our research can be seen on one side as providing further evidence to the growing body of literature documenting the existence of a bank balance sheet channel. The bank balance sheet channel reflects the inability of banks to cushion borrowing firms against shocks, causing banks to curtail lending. However, for the bank balance sheet channel to be effective, bank-dependent borrowers must exist such that the decline in credit supply will be evidenced in firm's real outcomes. Bank-dependent borrowers arise due to high information costs in external financing faced by certain borrowers, which causes them to be dependent on their bank, or face high costs of switching lenders or forms of financing. Convincing evidence for existence of the channel must identify that bank decisions affected the firms' availability of funds and costs of borrowing, while controlling for borrower characteristics.

Our research on the injunctions received by certain banks in 2010 offers compelling evidence for the existence of such a channel along with the existence of bank-dependent borrowers, as we document a decrease in leverage and an increase in the cost of funding for firms borrowing from injunction banks. Furthermore, the existence of bank-dependent borrowers is further documented through the lack of clear evidence of firms compensating

the decline in credit with equity but also through the significant decline in asset growth experienced by firms borrowing from injunction banks. We further confirm that high-information cost borrowers are indeed more impacted by the shock as small, young firms experienced the strongest effect in term of precautionary cash savings and decrease in firm growth.

Confirmation on the existence of such channel of transmission grounds the need to understand the determinants of shocks to the financial sector, as to prevent its propagation onto the real economy. The increase focus on banking regulation comes as an attempt to prevent the propagation of banking shocks to the economy. However, implementing and ensuring compliance with regulation can in itself generate an impact on the financial intermediaries, which can be further bred into the real economy as evidenced by the 2010 injunctions.

To this end, our work can also be seen as contributing to the body of research on the implications of Basel III in Denmark. Whereas others have focused on the effects on banks, we take a further step and outline real outcomes of possible future bank capital adjustments. Although the minimum capital requirements are maintained at 8% by the time the CRD IV/CRR will be fully implemented, there will be increases in the quality of the capital as well as compulsory capital buffers, in particular for SIFI's.

Whether adjusting to the new regulations will mean that banks will need to increase their core capital, the firm effects that we have observed would be expected to be seen for all bank customers whose capital requirements will be raised. So if certain banks will indeed need to raise their capital as we have seen in 2010 we would expect the effects on leverage, interest expense, cash holdings and asset growth to impact their corporate customers in the short term. Though short lived, the full impact on the economy of these effects must be considered.

To comply with regulatory capital requirements, SIFI's will face additional buffers relative to their systemic importance determined by the regulatory authorities. Given their share of total corporate lending, they as well stand to impact a larger number of firms similarly to what we have seen for the customers of Danske Bank and Sydbank after the 2010 capital injunctions.

The firm outcomes that we have documented occurred after a sudden shock to the banks receiving the injunction, while the implementation of the new capital requirements take

place over a period of several years, leaving a longer adjustment time and perhaps spreading of the impact observed over a longer horizon, thus diminishing its short term intensity.

Nevertheless, the discussion is still pertinent, granted that the latest financial stability assessment made by Danmarks Nationalbank (2015) finds that while banks meet the minimum capital requirements, they have not yet fully adjusted to the future capital conservation, countercyclical and SIFI buffers to be phased in by 2019.

References

Articles, Books, Journals and Studies

Abildgren, K., Buchholst, B.V. & Staghøj, J., 2011. Bank-firm relationships and the performance of non-financial firms during the financial crisis 2008-09 -microeconometric evidence from large-scale firm-level data, Copenhagen K.

Agur, I., 2013. Wholesale Bank Funding, Capital Requirements and Credit Rationing Wholesale Bank Funding, Capital Requirements and Credit Rationing 1 Prepared by Itai Agur,

Altman, E.I., 1983. Corporate financial distress: A complete guide to predicting, avoiding, and dealing with bankruptcy, Available at:

Altman, E.I., 1968. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. Journal of Finance, 23(4), pp.589–609.

Altman Edwards, 1993. Corporate financial distress: A complete guide to predicting avoiding bankruptcy, New York: John Wiley and Sons.

Amediku, S. (SMC U., 2011. Was Basel III Necessary and Will It Bring About Prudent Risk Management in Banking ?

Amiti, M. & Weinstein, D.E., 2011. Exports and financial shocks . The Quaterly Journal of Economics, 126(4), pp.1841–1877.

Anari, A. & Kolari, J., 1999. Nonmonetary effects of the financial crisis in the Great Depression. Journal of Economics and Business, 51(3), pp.215–235.

Ardishvili A, Cardozo S, Harmon S, V.S., 1998. Towards a theory of new venture growth. In Babson Entrepreneurship Research Conference. Ghent, Belgium.

Ashcraft, A.B., 2001. New Evidence on the Lending Channel. Journal of Money,Credit and Banking.

Baltagi, B.H., 2008. Forecasting with panel data. Journal of Forecasting, 27(2), pp.153–173.

Basel Commitee on Banking Supervison, 2014. Revisions to the securitisation framework.

Basle, 1988. Basle committee on banking supervision international convergence of capital measurement and capital standards.

Bates, T.W., Kahle, K.M. & M Stulz, R.E., 2009. Why Do U.S. Firms Hold So Much More Cash than They Used To? The journal of finance, (5).

Bernanke, B.S. & Blinder, A.S., 1988. Credit, money, and aggregate demand. American Economic Review, 78(2), pp.435–439.

Bernanke, B.S. & Gertler, M., 1989. Agency Costs, Net Worth, and Business Fluctuations. The American Economic Review, 79(1), pp.pp. 14–31.

Bernanke, B.S. & Gertler, M., 1995. Inside the Black Box: The Credit Channel of Monetary Policy Transmission. Journal of Economic Perspectives, 9(4), pp.27–48.

Bernanke, B.S., Gertler, M. & Gilchrist, S., 1996. The Financial Accelerator and the Flight to Quality. Review of Economics and Statistics, 78(1), pp.1–15.

Black, L.K. & Rosen, R.J., 2007. How the Credit Channel Works: Differentiating the Bank Lending Channel and the Balance Sheet Channel;

Blundell-Wignall, A. & Atkinson, P.E., 2010. Thinking beyond Basel III: Necessary Solutions for Capital and Liquidity. OECD Journal: Financial Market Trends, 2010(1), pp.9–33.

Brunnermeier, M.K. & Pedersen, L.H., 2008. Market Liquidity and Funding Liquidity. The Review of Financial Studies.

Bryman, A. & Bell, E., 2007. Business Research Methods,

Burrell, G. & Morgan, G., 1982. Sociological Paradigms and organisational Analysis - Elements of the Sociology of Corporate Life. Sociological Paradigms and organisational analysis, pp.1–37.

Caldeira, J. & Loncan, T., 2013. Capital Structure, Cash Holdings and Firm Value: A Study of Brazilian Listed Firms. SSRN Electronic Journal.

Calomiris, C., Himmelberg, C. & Wachtel, P., 1994. Commercial Paper, Corporate Finance, and the Business Cycle: A Microeconomic Perspective, Cambridge, MA.

Campello, $ Murillo, Graham, J.R. & Harvey, C.R., 2010. The real effects of financial constraints: Evidence from a financial crisis. Journal of Financial Economics, 97, pp.470–487.

Carlstrom, C.T. & Fuerst, T.S., 1997. Agency Costs, Net Worth, and Business Fluctuations: A Computable General Equilibrium Analysis. American Economic Review, 87(5), pp.893–910.

Carlstrom, C.T. & Fuerst, T.S., 2001. Monetary shocks, agency costs, and business cycles. Carnegie-Rochester Conference Series on Public Policy, 54(1), pp.1–27.

Carpenter, R.E. & Petersen, B.C., 2002. Capital market imperfections, high-tech investment, and new equity financing. The Economic Journal, 112(477), pp.F54–

Carvalho, D., Ferreira, M.A. & Matos, P., 2013. Lending Relationships and the Effect of Bank Distress: Evidence from the 2007-2008 Financial Crisis. Journal of Financial and Quantitative Analysis, p.(forthcoming).

Casu B., Girardone C. 2006 Bank competition, concentration and efficiency in the single European market; Manchester School; vol: 74 (4) pp: 441-468

Catarineu-Rabell, E., Jackson, P. & Tsomocos, D.P., 2005. Procyclicality and the new Basel Accord - Banks' choice of loan rating system. Economic Theory, 26(3), pp.537–557.

Chodorow-Reich, G., 2013. The Employment Effects of Credit Market Disruptions: Firm-level Evidence from the 2008-09 Financial Crisis.

Colliard, J.-E., 2012. Rational blinders:is it possible to regulate banks using their internal risk models? Journal of Economic Literature.

Committee on Banking Supervision, B., 2010. Basel Committee on Banking Supervision Basel III: A global regulatory framework for more resilient banks and banking systems.

Committee on Banking Supervision, B., 2006. International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version, June 2006.

Committee on Banking Supervision, B., 2011. The transmission channels between the financial and real sectors: a critical survey of the literature - February 2011.

DeAngelo, H. & Stulz, R.M., 2013. Why High Leverage is Optimal for Banks. SSRN Electronic Journal.

Delmar, F., 1997. Measuring growth: methodological considerations and empirical results. Entrepreneurship and SME Research: On its Way to the Next Millennium., pp.190–216.

Demirgüç-Kunt, A. & Detragiache, E., 2009. Basel Core Principles and Bank Soundness Does Compliance Matter?

Danmarks Nationalbank, 2014. Financial Stability 1st Half

Danmarks Nationalbank, 2015. Financial Stability 2nd Half

Danmarks Nationalbank, 2009. Finansiel Stabilitet Annual Report

Danmarks Nationalbank, 2011. Finansiel Stabilitet Annual Report

Diamond, D.W., 1984. The Review of Economic Studies Ltd. Financial Intermediation and

Delegated Monitoring. The Review of Economic Studies, 51(3), pp.393–414.

Diamond, D.W., Rajan, R. & Rajan, R.G., 2009. The Credit Crisis: Conjectures about Causes and Remedies. American Economic Review, 99(2), pp.606–10.

Diamond, D. W., Dybvig, P.H.J., 1983. Bank runs, deposit insurance and liquidity. Journal of Political Economy , 91(3), pp.410–419.

Disyatat, P., 2010. The bank lending channel revisited. Bank for International Settlements.

Douglas W. Diamond, R.G.R., 2005. Liquidity Shortages and Banking Crises. Journal of Finance, 60(2), pp.615–47.

Dwenger Nadja, Fossen M. Frank, S.M., 2015. From financial to real economic crisis: Evidence from individual firm-bank relationship in Germany,

Elliott, D.J., 2010. Basel III, the Banks, and the Economy. The Brookings Institution.

Ergungor, O.E., 2005. The profitability of bank-borrower relationships. Journal of Financial Intermediation, 14(4), pp.485–512.

Fazzari, S.M. & Petersen, B.C., 1993. Working Capital and Fixed Investment: New Evidence on

Financing Constraints. The RAND Journal of Economics, 24(3), p.328.
Ferreira, M.A. & Vilela, A.S., 2004. Why Do Firms Hold Cash? Evidence from EMU Countries. European Financial Management, 10(2), pp.295–319.
Finanstilsynet, 2011. Redegoerelse Amagerbanken
Finanstilsynet, 2016. Redegoerelse Fjordbank Mors
Fisher, I., 1933. The Debt-Deflation Theory of Great Depressions. Econometrica, 1(4), pp.337–357.
Friedman Milton, S.J.A., 1963. A Monetary History of the United States, 1867-1960, Princeton: Princeton U. Press.
Fukuda, S., Kasuya, M. & Akashi, K., 2009. Impaired Bank Health and Default Risk. Pacific-Basin Finance Journal, 17, pp.145–162.
Fukuda, S.-I., Kasuya, M. & Nakajima, J., 2005. Bank Health and Investment: An Analysis of Unlisted Companies in Japan Bank of Japan Working Paper Series An Analysis of Unlisted Companies in Japan *.
Gambini, A. & Zazzaro, A., 2013. Long-lasting bank relationships and growth of firms. Small Business Economics, 40(4), pp.977–1007.
Ghosh, D. & Vogt, A., 2012. Outliers: An Evaluation of Methodologies.
Gugler Klaus, Mueller C. Dennis, Y.B.B., 2004. Marginal q, Tobin's q, Cash Flow and Investment. Southern Economic Journal, 70(3), pp.512–531.
Hadlock, C.J. & Pierce, J.R., 2010. New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. Review of Financial Studies, 23(5), pp.1909–1940.
Haltiwanger John, Ron Jarmin, J.M., 2013. Who Creates Jobs? Small vs. Large vs. Young. The Review of Economics and Statistics, 95(2).
Van Den Heuvel, 2007. The Bank Capital Channel of Monetary Policy and numerous seminar participants for valuable comments.
Holmstrom, B. & Tirole, J., 1997. Financial Intermediation, Loanable Funds, and the Real Sector. Quarterly Journal of Economics, 112(3), pp.663–91.
Honjo, Y. & Harada, N., 2006. SME Policy, Financial Structure and Firm Growth: Evidence From Japan. Small Business Economics, 27(4-5), pp.289–300.
Hubbard, R.G., 1997. Capital-Market Imperfections and Investment. NBER Working Papers.
Hubbard, R.G., Kuttner, K.N. & Palia, D.N., 2002. Are there bank effects in borrowers' costs of funds? Evidence from a matched sample of borrowers and banks. Journal of Business, 75(4), pp.559–581.
International Monetary Fund, 2014. Country Report No. 14/351
Ivashina, V. & Scharfstein, D., 2010. Bank Lending During the Financial Crisis of 2008. Journal of Financial Economics, 97(3), pp.319–338.
Iyer, R. et al., 2014. Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007-2009 crisis. Review of Financial Studies, 27(1), pp.347–372.
Jensen Lærkholm Thais, 2015. Credit Supply and The Real Economy. University of Copenhagen.
Jesper Rangvid, 2013. The financial crisis in Denmark.
Joeveer, K. et al., 2004. CERGE-EI Does bank failure affect client firms? Micro evidence from Estonia.
Jovanovic Boyan, 1982. Selection and Evolution of Industry. Econometrica, 50(3), pp.649–670.
Judge, A. & Korzhenitskaya, A., 2012. Credit market conditions and the impact of access to the public debt market on corporate leverage. International Review of Financial Analysis, 25, pp.28–63.
Kashyap, A.K. & Stein, J.C., 2010. An Analysis of the Impact of " Substantially Heightened " Capital Requirements on Large Financial Institutions.
Kashyap, A.K. & Stein, J.C., 2000. What Do a Million Observations on Banks Say About the Transmission of Monetary Policy? American Economic Review , 90(3), pp.407–28.
Kashyap, Anil K., Jeremy C. Stein, and D.W.W., 1993. Monetary Policy and Credit Conditions:

Evidence from the Composition of External Finance. American Economic Review, 83(1).
Kaufman, G.G., 1994. Bank contagion: A review of the theory and evidence. Journal of Financial Services Research, 8(2), pp.123–150.
Kellogg, M.A.P., 1999. Banks and the Role of Lending Relationships: Evidence from the U.S. Experience.
Khwaja, A.I. & Mian, A., 2008. Tracing the Impact of Bank Liquidity Shocks: Evidence from an Emerging Market. American Economic Review, 98(4), pp.1413–1442.
Khwaja Ijaz Asim & Mian Atif, 2008. Tracing the Impact of Bank Liquidity Shocks:Evidence from an Emerging Market.
Kirchhoff B. & Norton E, 1992. Schumpeterian Creative Destruction Versus Gibrats Law: an Examination of the relationship between firm size and growth. In ICBS 36th Annual World Conference. Toronto, Canada.
Kiyotaki, N. & Moore, J., 1997. Credit Cycles. Journal of Political Economy, 105(2), pp.211–248.
Kuchler, A., 2015. Firm leverage and investment during the crisis. Danmarks Nationalbank. , (96).
Lang, W.W. & Nakamura, L.I., 1995. "Flight to quality" in banking and economic activity. Journal of Monetary Economics, 36(1), pp.145–164.
Leary M.T., 2009. Bank loan supply, lender choice, and corporate capital structure. Journal of Finance, (64), pp.1143–1185.
Ma, M., Ghafar Ismail, A. & Hassan Shaari bin Mohd Noor, A., 2011. Bank health and firm investment : a panel data analysis for malaysia.
MacKay, P. & Phillips, G.M., 2005. How does industry affect firm financial structure? Review of Financial Studies, 18(4), pp.1433–1466.
Mcvanel, D. & Perevalov, N., 2008. Financial Constraints and the Cash-Holding Behaviour of Canadian Firms,
Miller, M.H. & Orr, D., 1966. A Model of the Demand for Money by Firms. The Quarterly Journal of Economics, 80(3), p.413.
Mitto U.R., Z.Z., 2008. The capital structure of multinational corporations: Canadian versus U.S. evidence. Journal of Corporate Finance, (14), pp.706–720.
Mo Vaziri, Rafiqul Bhuyan & Ponkala Anand Vaseekhar Manuel, 2012. Comparative predictability of failure of financial institutions using multiple models. Investment Management and Financial Innovations, 9(120).
Moosa, I.A., 2010. Basel II as a casualty of the global financial crisis. Journal of Banking Regulation, 11(2), pp.95–114.
Myers, S.C. & Majluf, N.S., 1984. Corporate Financing and Investment Decisions When Firms Have InformationThat Investors Do Not Have. Journal of Finance and Economics, 13, pp.187–221.
Ogawa, K., 2013. Firm Investment, Liquidity, and Bank Health: A Panel Study of Asian Firms in the 2000s,
Oliner, S.D. & Rudebusch, G.D., 1996. Is There a Broad Credit Channel for Monetary Policy ? FRBSF Economic Review, 1.
Opler, T. et al., 1999. The determinants and implications of corporate cash holdings. Journal of Financial Economics, 52, pp.3–46.
Opler, T.C. & Titman, S., 1994. Financial Distress and Corporate Performance. The Journal of Finance, 49(3), pp.1015–1040.
Ozkan, A. & Ozkan, N., 2004. Corporate cash holdings: An empirical investigation of UK companies. Journal of Banking & Finance, 28(9), pp.2103–2134.
Peek, J. et al., 2013. The Role of Banks in the Transmission of Monetary Policy.
Peek, J. & Rosengren, E.S., 2000. Collateral Damage: Effects of the Japanese Bank Crisis on Real Activity in the United States. American Economic Review, 90(1), pp.30–45.
Pfaffermayr, M., Stöckl, M. & Winner, H., 2013. Capital Structure, Corporate Taxation and Firm Age*. Fiscal Studies, 34(1), pp.109–135.

Poulsen, T., 2013. Corporate control and underinvestment. Journal of Management and Governance.
Rajan, R.G. & Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. Journal of Finance, 50, pp.1421–1460.
Remenyi, D. et al., 1998. Doing Research in Business and Management: An Introduction to Process and Method,
Repullo Rafael & Javier Suarez, 2009. The Procyclical Effects of Bank Capital Regulation,
Rigsrevisionen, 2009. Report to the Public Accounts Committee on the Danish Financial Supervisory Authority's activities in relation to Roskilde Bank A/S,
Romer, C.D. & Romer, D.H., 1990. New Evidence on t he Monetary Transmission Mechanism. Brooking Papers on Economic Activity, pp.149–198.
Saunders, M., Lewis, P. & Thornhill, a., 2009. Research Methods for Business Students, Available at: http://books.google.com/books?id=u-txtfaCFiEC&pgis=1.
Schnabl, P., 2012. The International Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market. Journal of Finance, 67(3), pp.897–932.
Sharpe, S.A., 1990. Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model of Customer. The Journal of finance, 45(4), pp.1069–1087.
Slovik, P. & Cournède, B., 2011. Macroeconomic Impact of Basel III. OECD Economics Department Working, (844).
Stein, J.C., 1998. An Adverse-Selection Model of Bank Asset and Liability Management with Implications for the Transmission of Monetary Policy. RAND Journal of Economics, 29(3), pp.466–486.
Stiglitz Joseph & Weiss Andrew, 1981. Credit Rationing in Markets with Imperfect Information. The American Economic Review, 71(3), pp.393–410.
Stokes D., 1995. Small Business Management 2nd ed., BPC Hazell.
Storey D. J., 1994. Understanding the small business sector Inter national Thomson business press, ed., London-Boston.
Yamada, K., 2013. How bank health affects the capital structure and performance of IPO firms: evidence from the Japanese financial crisis in the 1990s. The Handbook of Research on IPOs, pp.552–568.

Online Sources

Denmark Statistics Statbank. Available at:
http://www.statbank.dk/statbank5a/default.asp?w=1440

European Banking Authority: Implementing Basel III in Europe :CRD IV package. Available at:
http://www.eba.europa.eu/regulation-and-policy/implementing-basel-iii-europe

Finanstisynet, The Supervisory Diamond for Banks. Available at:
https://www.finanstilsynet.dk/en/Tal-og-fakta/Statistik-noegletal-analyser/Tilsynsdiamanten.aspx

Post Danmark. Available at:
http://www.postdanmark.dk/da/Privat/Kundeservice/postnummerkort/Sider/postnummerkort.aspx.

World Bank Databank: Denmark GDP. Available at:
http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG/countries/DK?display=graph

Appendices

Appendix A: List of Variables Used

Injunction = represents a dummy variable taking the value of 1 in 2010 if the firm's primary bank has received an injunction in 2010

Injunction (Lag) = represents a dummy variable taking the value of 1 in 2011 if the firm's primary bank has received an injunction in 2010

Injunction (Lag2) = represents a dummy variable taking the value of 1 in 2012 if the firm's primary bank has received an injunction in 2010

Z-score Bank (Lag) = represents the firm's primary bank's Z-score one year prior to the measurement of the firm dependent variable

Z-score Bank (Lag2) = represents the firm's primary bank's Z-score two years prior to the measurement of the firm dependent variable

Leverage = book value of debt including short and long term debt divided by book value of assets at the firm level.

Bank Health = represents our proxy for bank health for the previous periods .This will be either the Z-score for the bank or the Injunction dummy.

Log (Total Assets) = represents the natural logarithm of the firm total assets and is a proxy for the size of the firm.

Log (Employees) = represents the natural logarithm of the firm total number of employees and is a proxy for the size of the firm.

Log (Firm Age) = represents the natural logarithm of the firm's age

Firm Z-Score = represents the firm's probability of default calculated in the same manner as the bank's Z-score and it is our proxy for the firm's bankruptcy risk

ROE = represents the firms return on equity calculated as net income divided by book value of equity and it is our proxy for firm profitability

Interest Expense = represents the firm's approximate interest paid on the loans taken out and it is calculated as the Interest expense reported on their income statement divided by firm's total debt at time for one period.

Cash Flow= our proxy for firm cash flow is represented by EBITDA (earnings before interest, tax and amortization) divided by firm total assets

Tangibility= Property, Plant and Equipment divided by total assets.

Cash Holdings=Cash and cash equivalents for the year divided by total assets

Issued Equity = (ΔTotal Equity-ΔRetained Earnings)/Total Assets

Investments= After tax profits +Depreciation –Dividends + ΔDebt + ΔEquity

Legal Form= represents a dummy variable which takes the value of 1 if the firm's legal form is A/S and 0 otherwise.

Industry=includes a series of dummy variables for each industry present within our dataset

Region=includes a series of 4 dummy variables for the 5 major regions in Denmark

Excess Coverage Ratio = is a measure of the bank's excess coverage after the fulfillment of the statutory minimum liquidity requirements and is calculated as a percentage of the liquidity requirement

Loan Growth = represents the bank's growth in loans for the period over total loans at the beginning of the period.

Large Exposures = are defined as the sum of assets and off-balance-sheet items that, after a reduction for secured exposures, exceeds 10% of the combined Core capital and supplementary capital. It is stated as a percentage of core capital.

Impairment Ratio = used as a proxy for the bank's commercial property as the commercial property segment experienced large write-off in the aftermath of the financial crisis.

Appendix B: Empirical Results

Table 3: Bank Z-score Effect on Firm Leverage

VARIABLES	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage
Z-score Bank (Lag)	-0.00702*		-0.00682*	-0.00737**
	(0.00393)		(0.00369)	(0.00375)
	0.0744		0.0647	0.0499
Z-score Bank (Lag2)		0.00665		
		(0.00452)		
		0.142		
Firm Controls				
Log (Firm Age)			-0.0247***	-0.0249***
			(0.00454)	(0.00455)
			5.85e-08	4.86e-08
Interest Expense			-0.0487***	-0.0482***
			(0.00260)	(0.00261)
			0	0
Firm Z-score			-0.00632***	-0.00630***
			(0.00148)	(0.00147)
			1.90e-05	1.85e-05
ROE			0.000444	0.000454
			(0.00358)	(0.00359)
			0.901	0.899
Log (Total Assets)			0.00231	0.00259
			(0.00307)	(0.00306)
			0.453	0.398
Bank Controls				
Excess Coverage Ratio				0.000122
				(7.89e-05)
				0.122
Loan Growth				0.000155
				(0.000308)
				0.615
Large Exposures				-0.000147
				(0.000116)
				0.205
Impairment Ratio				0.00205*
				(0.00121)
				0.0915
Observations	7,257	6,541	6,419	6,399
R-squared	0.020	0.020	0.157	0.159
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.0173	0.0171	0.154	0.155

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 4: Bank Injunction Effect on Firm Leverage

VARIABLES	(1) Leverage	(2) Leverage	(3) Leverage	(4) Leverage	(5) Leverage
Injunction	-0.0396***	-0.0456***	-0.0486***	-0.0479***	-0.0486***
	(0.0107)	(0.0116)	(0.0129)	(0.0116)	(0.0109)
	0.000220	8.85e-05	0.000164	3.73e-05	7.98e-06
Injunction (Lag)		-0.0384***	-0.0416***	-0.0180	
		(0.0117)	(0.0136)	(0.0112)	
		0.00108	0.00232	0.108	
Injunction (Lag2)			-0.0133		
			(0.0127)		
			0.292		
Firm Controls:					
Log (Total Assets)				0.00401	0.00340
				(0.00392)	(0.00299)
				0.306	0.255
Log (Firm Age)				-0.0307***	-0.0250***
				(0.00619)	(0.00439)
				7.75e-07	1.37e-08
Interest Expense				-0.0513***	-0.0460***
				(0.00391)	(0.00213)
				0	0
Firm Z-score				-0.00589***	-0.00651***
				(0.00161)	(0.00146)
				0.000263	8.94e-06
ROE				-0.000756	0.000808
				(0.00564)	(0.00338)
				0.893	0.811
Bank Controls					
Excess Coverage Ratio					5.93e-05
					(8.05e-05)
					0.461
Loan Growth					0.000289
					(0.000276)
					0.295
Large Exposures					-2.80e-05
					(9.71e-05)
					0.773
Impairment Ratio					0.00134
					(0.00120)
					0.265
Observations	3,542	3,542	3,542	3,180	7,151
R-squared	0.029	0.032	0.032	0.172	0.165
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.0235	0.0258	0.0259	0.165	0.161

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 5: Bank Z-score Effect on Interest Expense

VARIABLES	(1) Interest Expense	(2) Interest Expense	(3) Interest Expense	(4) Interest Expense
Z-score Bank (Lag)	0.0496**		0.0437**	0.0319
	(0.0194)		(0.0195)	(0.0219)
	0.0107		0.0250	0.145
Z-score Bank (Lag2)		0.0139		
		(0.0227)		
		0.540		
Firm Controls				
Log (Total Assets)			0.0400**	0.0366**
			(0.0168)	(0.0168)
			0.0172	0.0292
Log (Firm Age)			0.0621***	0.0672***
			(0.0227)	(0.0228)
			0.00616	0.00320
ROE			-0.0265**	-0.0245**
			(0.0111)	(0.0111)
			0.0170	0.0279
Firm Z-score			-0.0107***	-0.0106***
			(0.00391)	(0.00395)
			0.00608	0.00707
Bank Controls				
Excess Coverage Ratio				-0.000752*
				(0.000398)
				0.0586
Loan Growth				-0.00455**
				(0.00185)
				0.0140
Large Exposures				0.00227*
				(0.00118)
				0.0552
Impairment Ratio				-0.0150***
				(0.00552)
				0.00672
Observations	6,474	5,822	6,419	6,399
R-squared	0.012	0.013	0.024	0.028
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.00886	0.00923	0.0200	0.0241

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 6: Bank Injunction Effect on Interest Expense

VARIABLES	(1) Interest Expense	(2) Interest Expense	(3) Interest Expense	(4) Interest Expense	(5) Interest Expense
Injunction	-0.0431	0.00101	-0.00166		
	(0.0584)	(0.0592)	(0.0622)		
	0.461	0.986	0.979		
Injunction (Lag)		0.281***	0.278***	0.261***	0.241***
		(0.0855)	(0.0877)	(0.0837)	(0.0859)
		0.00103	0.00153	0.00186	0.00512
Injunction (Lag2)			-0.0117		
			(0.0578)		
			0.839		
Firm Controls					
Log (Total Assets)				0.0540**	0.0516**
				(0.0228)	(0.0227)
				0.0181	0.0234
Log (Firm Age)				0.0528*	0.0632**
				(0.0282)	(0.0289)
				0.0612	0.0289
ROE				-0.0390***	-0.0371***
				(0.0136)	(0.0137)
				0.00416	0.00683
Firm Z-score				-0.0145***	-0.0145***
				(0.00547)	(0.00552)
				0.00817	0.00847
Bank Controls					
Excess Coverage Ratio					-0.000218
					(0.000627)
					0.729
Loan Growth					-0.00357
					(0.00261)
					0.172
Large Exposures					0.00229
					(0.00191)
					0.231
Impairment Ratio					-0.0192
					(0.0360)
					0.594
Observations	3,208	3,208	3,208	3,180	3,180
R-squared	0.019	0.024	0.024	0.046	0.050
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.0122	0.0173	0.0170	0.0389	0.0415

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 7: Bank Z-score Effect on Cash Holdings

VARIABLES	(1) Cash Holdings	(2) Cash Holdings	(3) Cash Holdings	(4) Cash Holdings
Z-score Bank (Lag)	-0.00651		-0.00787**	-0.00853**
	(0.00443)		(0.00394)	(0.00409)
	0.141		0.0460	0.0370
Z-score Bank (Lag2)		-0.00224		
		(0.00516)		
		0.664		
Firm Controls				
Tangibility			-0.279***	-0.278***
			(0.0136)	(0.0137)
			0	0
Leverage			-0.167***	-0.166***
			(0.0178)	(0.0177)
			0	0
Cash flow			0.0710***	0.0711***
			(0.0132)	(0.0132)
			8.26e-08	7.71e-08
Log (Firm Age)			-0.00313	-0.00278
			(0.00514)	(0.00517)
			0.543	0.591
Log (Total Assets)			-0.0335***	-0.0334***
			(0.00333)	(0.00333)
			0	0
Bank Controls				
Excess Coverage Ratio				8.87e-05
				(6.70e-05)
				0.186
Loan Growth				-0.000593*
				(0.000318)
				0.0627
Large Exposures				4.62e-05
				(0.000114)
				0.686
Impairment Ratio				-0.00287***
				(0.00104)
				0.00583
Observations	6,766	6,079	5,241	5,226
R-squared	0.043	0.042	0.205	0.206
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.0403	0.0392	0.201	0.202

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 8: Bank Injunction Effect on Cash Holdings

VARIABLES	(1) Cash Holdings	(2) Cash Holdings	(3) Cash Holdings	(4) Cash Holdings	(5) Cash Holdings
Injunction	0.00667	0.00868	0.0108	0.0112	
	(0.0133)	(0.0144)	(0.0161)	(0.0147)	
	0.616	0.547	0.500	0.445	
Injunction (Lag)		0.0130	0.0152	0.00665	
		(0.0145)	(0.0169)	(0.0153)	
		0.370	0.367	0.664	
Injunction (Lag2)			0.00942	0.0260*	0.0270**
			(0.0149)	(0.0139)	(0.0120)
			0.529	0.0616	0.0244
Firm Controls					
Log (Total Assets)				-0.0298***	-0.0302***
				(0.00397)	(0.00398)
				0	0
Log (Firm Age)				-0.00318	-0.00282
				(0.00689)	(0.00685)
				0.645	0.681
Tangibility				-0.259***	-0.259***
				(0.0178)	(0.0179)
				0	0
Leverage				-0.155***	-0.154***
				(0.0232)	(0.0231)
				0	0
Cash flow				0.0663***	0.0671***
				(0.0181)	(0.0181)
				0.000254	0.000215
Bank Controls					
Excess Coverage Ratio					9.64e-06
					(8.25e-05)
					0.907
Loan Growth					-0.000152
					(0.000434)
					0.727
Large Exposures					0.000175
					(0.000152)
					0.250
Impairment Ratio					-0.0152**
					(0.00623)
					0.0147
Observations	3,333	3,333	3,333	2,607	2,607
R-squared	0.044	0.045	0.045	0.197	0.199
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.0383	0.0383	0.0381	0.188	0.190

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 9: Bank Z-score Effect on Issued Equity

VARIABLES	(1) Issued Equity	(2) Issued Equity	(3) Issued Equity	(4) Issued Equity
Z-score Bank (Lag)	-0.00390		-0.00113	-0.000928
	(0.00275)		(0.00298)	(0.00328)
	0.156		0.704	0.777
Z-score Bank (Lag2)		-0.00328		
		(0.00295)		
		0.265		
Firm Controls				
Log (Firm Age)			-0.00345	-0.00354*
			(0.00217)	(0.00215)
			0.113	0.0998
ROE			0.000580	0.000564
			(0.000759)	(0.000757)
			0.445	0.456
Firm Z-score			1.35e-05	1.93e-05
			(0.000166)	(0.000166)
			0.935	0.907
Tangibility			-0.00412	-0.00431
			(0.00674)	(0.00680)
			0.542	0.527
Log (Total Assets)			0.000275	0.000296
			(0.00124)	(0.00124)
			0.824	0.812
Bank Controls				
Excess Coverage Ratio				-1.41e-05
				(3.11e-05)
				0.651
Loan Growth				-4.29e-05
				(0.000182)
				0.814
Large Exposures				-4.64e-05
				(6.41e-05)
				0.469
Impairment Ratio				0.000525
				(0.000806)
				0.515
Observations	3,528	2,824	2,812	2,812
R-squared	0.003	0.003	0.007	0.007
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.00275	-0.00393	-0.00202	-0.00317

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 10: Bank Injunction Effect on Issued Equity

VARIABLES	(1) Issued Equity	(2) Issued Equity	(3) Issued Equity	(4) Issued Equity	(5) Issued Equity
Injunction	-0.00692	-0.00680	-0.00795	-0.00247	0.000495
	(0.00654)	(0.00655)	(0.00674)	(0.00642)	(0.00698)
	0.290	0.299	0.238	0.700	0.943
Injunction (Lag)		0.000749	-0.000418	0.00420	0.00468
		(0.00642)	(0.00634)	(0.00634)	(0.00649)
		0.907	0.947	0.508	0.471
Injunction (Lag2)			-0.00461	0.00116	0.000436
			(0.00479)	(0.00480)	(0.00490)
			0.337	0.809	0.929
Firm Controls					
Log (Firm Age)				-0.00321	-0.00300
				(0.00261)	(0.00258)
				0.219	0.245
ROE				0.000727	0.000478
				(0.000942)	(0.000954)
				0.441	0.617
Firm Z-score				1.28e-05	2.81e-05
				(0.000177)	(0.000178)
				0.942	0.874
Tangibility				-0.00162	-0.00131
				(0.00732)	(0.00737)
				0.825	0.859
Log (Total Assets)				7.86e-05	8.85e-05
				(0.00172)	(0.00173)
				0.964	0.959
Bank Controls					
Excess Coverage Ratio					-1.56e-05
					(4.09e-05)
					0.702
Loan Growth					-0.000251
					(0.000206)
					0.223
Large Exposures					-7.11e-05
					(8.78e-05)
					0.418
Impairment Ratio					0.00631*
					(0.00362)
					0.0818
Observations	2,824	2,824	2,824	2,229	2,229
R-squared	0.003	0.003	0.003	0.008	0.010
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	-0.00395	-0.00431	-0.00439	-0.00370	-0.00312

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 11: Bank Z-score Effect on Asset Growth

VARIABLES	(1) Δ Assets	(2) Δ Assets	(3) Δ Assets	(4) Δ Assets
Z-score Bank (Lag)	-0.0139			
	(0.0106)			
	0.192			
Z-score Bank (Lag2)		-0.0260**	-0.0240	-0.0173
		(0.0109)	(0.0159)	(0.0263)
		0.0176	0.131	0.510
Firm Controls				
Log (Firm Age)			-0.0283*	-0.0281*
			(0.0165)	(0.0168)
			0.0873	0.0944
Cash flow			-0.0141	-0.0141
			(0.212)	(0.213)
			0.947	0.947
Leverage			-0.107	-0.106
			(0.0687)	(0.0690)
			0.121	0.124
Employees (Log)			0.00424	0.00413
			(0.00860)	(0.00863)
			0.622	0.632
Bank Controls				
Excess Coverage Ratio				6.20e-05
				(0.000204)
				0.762
Loan Growth				-0.000509
				(0.00131)
				0.698
Large Exposures				0.000112
				(0.000379)
				0.767
Impairment Ratio				-0.00913
				(0.0193)
				0.636
Observations	3,527	2,823	1,160	1,160
R-squared	0.006	0.011	0.023	0.023
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.000342	0.00379	0.00313	-7.80e-06

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 12: Bank Injunction Effect on Asset Growth

VARIABLES	(1) Δ Assets	(2) Δ Assets	(3) Δ Assets	(4) Δ Assets	(5) Δ Assets
Injunction	-0.0113	-0.0148	-0.0242		
	(0.0228)	(0.0231)	(0.0239)		
	0.619	0.522	0.311		
Injunction (Lag)		-0.0209	-0.0305		
		(0.0250)	(0.0260)		
		0.401	0.240		
Injunction (Lag2)			-0.0377*	-0.0655*	-0.0632*
			(0.0209)	(0.0349)	(0.0364)
			0.0710	0.0608	0.0833
Firm Controls					
Employees (Log)				0.00318	0.00331
				(0.00857)	(0.00859)
				0.711	0.700
Log (Firm Age)				-0.0297*	-0.0285*
				(0.0166)	(0.0166)
				0.0741	0.0854
Cash flow				-0.0159	-0.0147
				(0.212)	(0.212)
				0.940	0.945
Leverage				-0.105	-0.106
				(0.0686)	(0.0688)
				0.125	0.122
Bank Controls					
Excess Coverage Ratio					2.35e-05
					(0.000178)
					0.895
Loan Growth					-0.000739
					(0.00117)
					0.526
Large Exposures					-3.94e-05
					(0.000383)
					0.918
Impairment Ratio					-0.0132
					(0.0142)
					0.354
Observations	2,823	2,823	2,823	1,160	1,160
R-squared	0.009	0.010	0.011	0.025	0.026
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.00222	0.00214	0.00287	0.00516	0.00267

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 13: Bank Z-score Effect on Employee Growth

VARIABLES	(1) Δ Employees	(2) Δ Employees	(3) Δ Employees	(4) Δ Employees
Z-score Bank (Lag2)		-0.0104	-0.00578	-0.000523
		(0.00787)	(0.00790)	(0.00995)
		0.187	0.465	0.958
Z-score Bank (Lag)	-0.00734			
	(0.0117)			
	0.529			
Firm Controls				
Log (Total Assets)			-0.0144	-0.0145
			(0.0130)	(0.0130)
			0.269	0.265
Log (Firm Age)			-0.0164**	-0.0165**
			(0.00769)	(0.00809)
			0.0340	0.0421
Cash flow			0.0148	0.0149
			(0.0189)	(0.0190)
			0.433	0.433
Leverage			-0.0336	-0.0335
			(0.0359)	(0.0367)
			0.350	0.363
Bank Controls				
Excess Coverage Ratio				-1.79e-05
				(9.66e-05)
				0.853
Loan Growth				-0.000206
				(0.000847)
				0.808
Large Exposures				7.32e-05
				(0.000238)
				0.758
Impairment Ratio				-0.00593
				(0.00949)
				0.532
Observations	1,190	835	826	826
R-squared	0.014	0.007	0.019	0.019
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.00266	-0.0160	-0.00897	-0.0138

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 14: Bank Injunction Effect on Employee Growth

VARIABLES	(1) Δ Employees	(2) Δ Employees	(3) Δ Employees	(4) Δ Employees	(5) Δ Employees
Injunction	-0.0384	-0.0437	-0.0461	-0.0397	-0.0472
	(0.0491)	(0.0494)	(0.0500)	(0.0465)	(0.0481)
	0.435	0.376	0.357	0.394	0.327
Injunction (Lag)		-0.0279	-0.0303	-0.0227	-0.0248
		(0.0193)	(0.0193)	(0.0196)	(0.0198)
		0.148	0.117	0.247	0.211
Injunction (Lag2)			-0.0151	-0.0135	-0.00883
			(0.0239)	(0.0238)	(0.0235)
			0.527	0.569	0.708
Firm Controls					
Log (Total Assets)				-0.0138	-0.0139
				(0.0124)	(0.0124)
				0.267	0.265
Log (Firm Age)				-0.0150**	-0.0140*
				(0.00749)	(0.00767)
				0.0461	0.0679
Cash flow				0.0141	0.0137
				(0.0187)	(0.0187)
				0.451	0.464
Leverage				-0.0397	-0.0380
				(0.0373)	(0.0376)
				0.288	0.313
Bank Controls					
Excess Coverage Ratio					-4.92e-05
					(9.16e-05)
					0.592
Loan Growth					0.000164
					(0.000718)
					0.819
Large Exposures					0.000253
					(0.000210)
					0.227
Impairment Ratio					-0.00785
					(0.00872)
					0.368
Observations	835	835	835	826	826
R-squared	0.009	0.010	0.011	0.022	0.023
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	-0.0138	-0.0138	-0.0148	-0.00877	-0.0129

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 15: Bank Z-score Effect on Investments

VARIABLES	(1) Investments	(2) Investments	(3) Investments	(4) Investments
Z-score Bank (Lag)	0.0256		0.0226	0.0201
	(0.0313)		(0.0321)	(0.0384)
	0.415		0.482	0.600
Z-score Bank (Lag2)		-0.000149		
		(0.0322)		
		0.996		
Firm Controls				
Log (Total Assets)			0.00847	0.00724
			(0.0382)	(0.0380)
			0.825	0.849
Log (Firm Age)			-0.0106	-0.00757
			(0.0345)	(0.0356)
			0.758	0.832
ROE			0.00735	0.00769
			(0.0346)	(0.0346)
			0.832	0.824
Cash Holdings			0.00136	-0.000257
			(0.101)	(0.101)
			0.989	0.998
Leverage			-0.199	-0.202
			(0.169)	(0.170)
			0.239	0.236
Cash flow			0.541*	0.544**
			(0.276)	(0.276)
			0.0502	0.0492
Bank Controls				
Excess Coverage Ratio				0.000472
				(0.000349)
				0.176
Loan Growth				-0.00400**
				(0.00182)
				0.0277
Large Exposures				-0.000527
				(0.00100)
				0.599
Impairment Ratio				-0.00662
				(0.00795)
				0.405
Observations	3,504	2,805	3,284	3,284
R-squared	0.004	0.004	0.022	0.023
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.00187	-0.00277	0.0136	0.0136

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 16: Bank Injunction Effect on Investments

VARIABLES	(1) Investments	(2) Investments	(3) Investments	(4) Investments	(5) Investments
Injunction	0.0420	0.0416	0.0178	-0.0550	0.0261
	(0.0552)	(0.0555)	(0.0569)	(0.0590)	(0.0722)
	0.447	0.454	0.754	0.352	0.718
Injunction (Lag)		-0.00263	-0.0267	-0.0527	-0.0134
		(0.0982)	(0.0998)	(0.107)	(0.108)
		0.979	0.789	0.621	0.901
Injunction (Lag2)			-0.0950	-0.114	-0.117
			(0.0857)	(0.0858)	(0.0882)
			0.268	0.184	0.185
Firm Controls					
Log (Total Assets)				0.0546**	0.0538**
				(0.0228)	(0.0227)
				0.0167	0.0176
Log (Firm Age)				-0.0151	-0.0139
				(0.0345)	(0.0354)
				0.661	0.695
ROE				0.0225	0.0220
				(0.0284)	(0.0285)
				0.428	0.440
Cash Holdings				0.0838	0.0843
				(0.109)	(0.109)
				0.444	0.441
Leverage				-0.0991	-0.0988
				(0.154)	(0.155)
				0.521	0.525
Cash flow				0.634*	0.638*
				(0.365)	(0.366)
				0.0823	0.0814
Bank Controls					
Excess Coverage Ratio					0.000701*
					(0.000374)
					0.0613
Loan Growth					-0.00564***
					(0.00195)
					0.00397
Large Exposures					-0.00149
					(0.00116)
					0.197
Impairment Ratio					0.0184
					(0.0250)
					0.463
Observations	2,805	2,805	2,805	2,622	2,622
R-squared	0.004	0.004	0.005	0.034	0.036
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	-0.00268	-0.00304	-0.00278	0.0233	0.0243

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Appendix C: Robustness Results

Table 17: Robustness Leverage (Z-score)

VARIABLES	(1) Leverage_Small	(2) Leverage_Large	(3) Leverage_Young	(4) Leverage_Old
Z-score Bank (Lag)	-0.00807	-0.00946**	-0.0105*	-0.00379
	(0.00609)	(0.00429)	(0.00562)	(0.00490)
	0.185	0.0276	0.0631	0.439
Firm Controls				
Log (Total Assets)	0.0225**	-0.00301	0.00186	0.00341
	(0.00938)	(0.00398)	(0.00409)	(0.00418)
	0.0165	0.449	0.650	0.414
Log (Firm Age)	-0.0168***	-0.0185***	-0.00554	-0.0140
	(0.00628)	(0.00609)	(0.00720)	(0.0153)
	0.00760	0.00236	0.441	0.360
Interest Expense	-0.0497***	-0.0434***	-0.0612***	-0.0407***
	(0.00453)	(0.00298)	(0.00608)	(0.00249)
	0	0	0	0
Firm Z-score	-0.00469***	-0.0251***	-0.00510***	-0.00771***
	(0.00110)	(0.00256)	(0.00180)	(0.00225)
	2.10e-05	0	0.00467	0.000639
ROE	-0.00853*	0.0148***	0.00111	-0.00196
	(0.00438)	(0.00478)	(0.00422)	(0.00636)
	0.0517	0.00193	0.792	0.758
Bank Controls				
Excess Coverage Ratio	6.22e-05	0.000154*	8.97e-06	0.000225*
	(9.28e-05)	(8.99e-05)	(7.64e-05)	(0.000127)
	0.503	0.0865	0.907	0.0761
Loan Growth	-0.000122	0.000123	-0.000206	0.000636
	(0.000496)	(0.000349)	(0.000425)	(0.000435)
	0.806	0.725	0.628	0.144
Large Exposures	-0.000460**	5.09e-05	-0.000138	-0.000155
	(0.000188)	(0.000133)	(0.000187)	(0.000148)
	0.0148	0.701	0.461	0.295
Impairment Ratio	0.000427	0.00281*	0.00386**	-4.84e-05
	(0.00152)	(0.00169)	(0.00172)	(0.00169)
	0.779	0.0975	0.0253	0.977
Observations	2,783	3,616	3,013	3,386
R-squared	0.145	0.325	0.136	0.184
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.136	0.320	0.127	0.176

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 18: Robustness Leverage (Injunction)

VARIABLES	(1) Leverage_Small	(2) Leverage_Large	(3) Leverage_Young	(4) Leverage_Old
Injunction	-0.0367**	-0.0415***	-0.0381**	-0.0448***
	(0.0185)	(0.0142)	(0.0172)	(0.0154)
	0.0472	0.00342	0.0273	0.00363
Firm Controls				
Log (Total Assets)	0.0225*	-0.000260	0.00291	0.00409
	(0.0127)	(0.00532)	(0.00542)	(0.00485)
	0.0760	0.961	0.591	0.400
Log (Firm Age)	-0.0278***	-0.0222***	-0.00854	-0.0119
	(0.00877)	(0.00838)	(0.0102)	(0.0196)
	0.00156	0.00816	0.403	0.545
Interest Expense	-0.0534***	-0.0452***	-0.0647***	-0.0428***
	(0.00697)	(0.00417)	(0.00853)	(0.00378)
	0	0	0	0
Firm Z-score	-0.00463***	-0.0224***	-0.00480***	-0.00689***
	(0.00116)	(0.00377)	(0.00185)	(0.00258)
	7.10e-05	4.04e-09	0.00961	0.00759
ROE	-0.0184***	0.0235***	-0.000123	-0.00350
	(0.00660)	(0.00730)	(0.00638)	(0.00979)
	0.00550	0.00133	0.985	0.721
Bank Controls				
Excess Coverage Ratio	7.70e-05	0.000197*	0.000112	0.000230
	(0.000135)	(0.000119)	(0.000117)	(0.000151)
	0.570	0.0989	0.340	0.128
Loan Growth	0.000716	-3.39e-05	-0.000385	0.00156**
	(0.000681)	(0.000487)	(0.000588)	(0.000621)
	0.293	0.945	0.513	0.0120
Large Exposures	-0.000313	-2.11e-05	-6.21e-05	-0.000145
	(0.000269)	(0.000162)	(0.000243)	(0.000192)
	0.244	0.897	0.798	0.450
Impairment Ratio	0.00111	-0.00805	-0.00446	-0.00896
	(0.00967)	(0.00664)	(0.00899)	(0.00777)
	0.908	0.226	0.620	0.249
Observations	1,393	1,787	1,403	1,777
R-squared	0.180	0.324	0.159	0.197
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.164	0.312	0.142	0.183

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 19: Robustness Interest Expense (Z-score)

VARIABLES	(1) Interest Expense Small	(2) Interest Expense Large	(3) Interest Expense Young	(4) Interest Expense Old
Z-score Bank (Lag)	0.00145	0.0571*	0.00959	0.0505
	(0.0242)	(0.0323)	(0.0282)	(0.0328)
	0.952	0.0769	0.734	0.124
Firm Controls				
Log (Total Assets)	-0.0177	0.0470*	0.0548**	0.0253
	(0.0417)	(0.0279)	(0.0247)	(0.0250)
	0.672	0.0920	0.0270	0.312
Log (Firm Age)	0.0541***	0.0737*	-0.00574	0.131
	(0.0198)	(0.0380)	(0.0280)	(0.0965)
	0.00626	0.0528	0.838	0.174
Firm Z-score	-0.0107**	2.80e-05	-0.0147**	-0.00697*
	(0.00463)	(0.00737)	(0.00647)	(0.00356)
	0.0211	0.997	0.0227	0.0503
ROE	-0.0126	-0.0400*	0.00533	-0.0626***
	(0.0127)	(0.0212)	(0.0153)	(0.0138)
	0.319	0.0587	0.728	5.92e-06
Bank Controls				
Excess Coverage Ratio	-0.000947**	-0.000746	0.000349	-0.00168***
	(0.000390)	(0.000521)	(0.000741)	(0.000433)
	0.0153	0.152	0.638	0.000109
Loan Growth	-0.00304	-0.00569**	-0.00211	-0.00787**
	(0.00227)	(0.00280)	(0.00212)	(0.00322)
	0.182	0.0423	0.319	0.0147
Large Exposures	0.00112	0.00274*	0.00327	0.00150
	(0.000911)	(0.00166)	(0.00202)	(0.000994)
	0.220	0.0998	0.105	0.131
Impairment Ratio	-0.00780*	-0.0230**	-0.0152**	-0.0149*
	(0.00422)	(0.0112)	(0.00748)	(0.00818)
	0.0646	0.0407	0.0424	0.0680
Observations	2,783	3,616	3,013	3,386
R-squared	0.042	0.033	0.060	0.028
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.0330	0.0249	0.0513	0.0191

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 20: Robustness Interest Expense (Injunction)

VARIABLES	(1) Interest Expense Small	(2) Interest Expense Large	(3) Interest Expense Young	(4) Interest Expense Old
Injunction(Lag)	0.284**	0.199*	0.201*	0.280**
	(0.129)	(0.115)	(0.104)	(0.126)
	0.0274	0.0843	0.0545	0.0264
Firm Controls				
Log (Total Assets)	-0.0244	0.0567	0.0663**	0.0383
	(0.0558)	(0.0350)	(0.0303)	(0.0325)
	0.663	0.105	0.0290	0.239
Log (Firm Age)	0.0470*	0.0683	-0.00118	0.174
	(0.0284)	(0.0474)	(0.0382)	(0.129)
	0.0988	0.150	0.975	0.179
Firm Z-score	-0.0148**	-0.000663	-0.0183*	-0.0116***
	(0.00642)	(0.00723)	(0.00936)	(0.00428)
	0.0215	0.927	0.0507	0.00699
ROE	-0.0181	-0.0528***	-0.0107	-0.0583***
	(0.0211)	(0.0171)	(0.0178)	(0.0197)
	0.392	0.00201	0.550	0.00314
Bank Controls				
Excess Coverage Ratio	-0.000853*	-0.000142	0.00126	-0.00101*
	(0.000488)	(0.000784)	(0.00115)	(0.000524)
	0.0805	0.856	0.274	0.0535
Loan Growth	-0.00566	-0.00142	-0.000953	-0.00786*
	(0.00384)	(0.00349)	(0.00292)	(0.00453)
	0.141	0.684	0.745	0.0826
Large Exposures	-0.00123*	0.00341	0.00578*	-0.000199
	(0.000708)	(0.00246)	(0.00309)	(0.000701)
	0.0832	0.166	0.0613	0.776
Impairment Ratio	0.0402	-0.0415	-0.0291	-0.0196
	(0.0629)	(0.0375)	(0.0585)	(0.0358)
	0.523	0.269	0.618	0.583
Observations	1,393	1,787	1,403	1,777
R-squared	0.083	0.051	0.109	0.051
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.0660	0.0349	0.0908	0.0349

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 21: Robustness Cash Holdings (Z-score)

VARIABLES	(1) Cash Small	(2) Cash Large	(3) Cash Young	(4) Cash Old
Z-score Bank (Lag)	-0.00914	-0.00805**	-0.00796	-0.00836
	(0.00836)	(0.00405)	(0.00581)	(0.00552)
	0.274	0.0468	0.171	0.130
Firm Controls				
Tangibility	-0.355***	-0.232***	-0.303***	-0.268***
	(0.0264)	(0.0159)	(0.0194)	(0.0184)
	0	0	0	0
Log (Total Assets)	-0.0636***	-0.0188***	-0.0328***	-0.0330***
	(0.0122)	(0.00373)	(0.00417)	(0.00517)
	2.28e-07	4.74e-07	0	2.54e-10
Log (Firm Age)	-0.00398	8.52e-05	-0.0103	-0.0406***
	(0.00843)	(0.00602)	(0.00818)	(0.0156)
	0.637	0.989	0.208	0.00958
CASH FLOW	0.0710***	0.112***	0.0627***	0.0805***
	(0.0150)	(0.0253)	(0.0225)	(0.0138)
	2.57e-06	1.12e-05	0.00528	7.51e-09
Leverage	-0.164***	-0.164***	-0.147***	-0.189***
	(0.0304)	(0.0216)	(0.0231)	(0.0264)
	8.15e-08	0	2.24e-10	0
Bank Controls				
Excess Coverage Ratio	1.24e-05	0.000103	-1.50e-05	0.000242***
	(0.000142)	(6.50e-05)	(8.25e-05)	(8.39e-05)
	0.930	0.113	0.856	0.00392
Loan Growth	-0.000300	-0.000614*	-0.000941**	-0.000152
	(0.000584)	(0.000347)	(0.000443)	(0.000462)
	0.607	0.0772	0.0339	0.742
Large Exposures	-0.000252	0.000121	1.69e-05	7.30e-05
	(0.000224)	(0.000122)	(0.000156)	(0.000158)
	0.260	0.322	0.914	0.645
Impairment Ratio	-0.00259	-0.00250**	-0.00261*	-0.00329**
	(0.00184)	(0.00124)	(0.00134)	(0.00165)
	0.159	0.0445	0.0522	0.0456
Observations	2,046	3,180	2,397	2,829
R-squared	0.170	0.203	0.214	0.217
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.159	0.195	0.205	0.209

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 22: Robustness Cash Holdings (Injunction)

VARIABLES	(1) Cash Small	(2) Cash Large	(3) Cash Young	(4) Cash Old
Injunction(Lag2)	0.0544**	0.00906	0.0371*	0.0202
	(0.0226)	(0.0132)	(0.0196)	(0.0151)
	0.0166	0.494	0.0586	0.183
Firm Controls				
Tangibility	-0.318***	-0.219***	-0.274***	-0.252***
	(0.0352)	(0.0207)	(0.0259)	(0.0236)
	0	0	0	0
Log (Total Assets)	-0.0556***	-0.0163***	-0.0280***	-0.0315***
	(0.0169)	(0.00452)	(0.00497)	(0.00628)
	0.00109	0.000327	2.58e-08	6.59e-07
Log (Firm Age)	-0.00408	-0.00289	-0.00844	-0.0453**
	(0.0118)	(0.00787)	(0.0110)	(0.0206)
	0.729	0.714	0.441	0.0283
CASH FLOW	0.0719***	0.103***	0.0764**	0.0599***
	(0.0213)	(0.0395)	(0.0333)	(0.0190)
	0.000794	0.00909	0.0220	0.00170
Bank Controls				
Leverage	-0.119***	-0.184***	-0.142***	-0.171***
	(0.0409)	(0.0275)	(0.0298)	(0.0343)
	0.00374	0	2.33e-06	7.27e-07
Excess Coverage Ratio	-7.42e-05	2.44e-05	-0.000144	0.000199**
	(0.000149)	(9.38e-05)	(9.91e-05)	(0.000101)
	0.620	0.794	0.147	0.0495
Loan Growth	-0.000343	6.83e-05	-0.000224	1.34e-05
	(0.000837)	(0.000441)	(0.000601)	(0.000633)
	0.682	0.877	0.710	0.983
Large Exposures	-5.66e-05	0.000192	0.000240	0.000141
	(0.000312)	(0.000158)	(0.000223)	(0.000182)
	0.856	0.224	0.283	0.438
Impairment Ratio	-0.00127	-0.0202***	-0.0137	-0.0161**
	(0.0142)	(0.00631)	(0.00939)	(0.00797)
	0.929	0.00146	0.146	0.0439
Observations	1,038	1,569	1,131	1,476
R-squared	0.156	0.209	0.213	0.212
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.134	0.194	0.193	0.197

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 23: Robustness Issued Equity (Z-score)

VARIABLES	(1) Equity Small	(2) Equity Large	(3) Equity Young	(4) Equity Old
Z-score Bank (Lag)	-0.000177	-0.00119	-0.00379	0.000272
	(0.00541)	(0.00407)	(0.00514)	(0.00462)
	0.974	0.771	0.462	0.953
Firm Controls				
Tangibility	-0.0153	-0.000530	0.00877	-0.00989
	(0.0136)	(0.00897)	(0.0114)	(0.00899)
	0.259	0.953	0.444	0.271
Log (Total Assets)	0.00538	-0.000345	-0.00115	0.00154
	(0.00495)	(0.00183)	(0.00149)	(0.00203)
	0.278	0.850	0.442	0.450
Log (Firm Age)	-0.00805**	-0.000267	-0.00808**	0.00880
	(0.00356)	(0.00287)	(0.00356)	(0.00623)
	0.0244	0.926	0.0236	0.158
Firm Z-score	-7.85e-05	-0.000207	-2.83e-05	8.41e-05
	(0.000163)	(0.000907)	(0.000190)	(0.000310)
	0.631	0.820	0.882	0.786
ROE	0.000292	0.000719	0.000322	0.000507
	(0.00105)	(0.00122)	(0.00117)	(0.00109)
	0.781	0.557	0.782	0.643
Bank Controls				
Excess Coverage Ratio	-1.94e-05	-1.79e-05	-4.85e-05	7.95e-06
	(5.29e-05)	(3.92e-05)	(4.59e-05)	(3.64e-05)
	0.714	0.648	0.291	0.827
Loan Growth	-1.58e-05	-2.07e-05	0.000237	-0.000167
	(0.000292)	(0.000240)	(0.000275)	(0.000246)
	0.957	0.931	0.390	0.498
Large Exposures	6.41e-05	-0.000116	-0.000189*	9.07e-05
	(9.87e-05)	(8.57e-05)	(0.000104)	(8.58e-05)
	0.516	0.178	0.0697	0.291
Impairment Ratio	0.000476	0.000414	0.00151	-0.000177
	(0.00121)	(0.00105)	(0.00153)	(0.00100)
	0.695	0.692	0.322	0.860
Observations	1,144	1,668	1,184	1,628
R-squared	0.025	0.011	0.025	0.013
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.00110	-0.00680	0.000787	-0.00467

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 24: Robustness Issued Equity (Injunction)

VARIABLES	(1) Equity Small	(2) Equity Large	(3) Equity Young	(4) Equity Old
Injunction	-0.00146	0.00397	-0.00129	-0.000374
	(0.00886)	(0.00998)	(0.0109)	(0.00932)
	0.869	0.691	0.905	0.968
Injunction(Lag)	0.00880	0.00303	-0.00127	0.00550
	(0.00912)	(0.00903)	(0.0106)	(0.00806)
	0.335	0.738	0.905	0.495
Injunction(Lag2)	0.0109	-0.00415	0.00703	-0.00452
	(0.00731)	(0.00634)	(0.00952)	(0.00595)
	0.137	0.513	0.461	0.448
Firm Controls				
Tangibility	-0.00333	0.00117	0.00866	-0.00523
	(0.0124)	(0.0110)	(0.0132)	(0.00932)
	0.789	0.915	0.511	0.575
Log (Total Assets)	0.00900	-0.00261	-0.000768	0.000631
	(0.00618)	(0.00258)	(0.00209)	(0.00266)
	0.146	0.313	0.714	0.812
Log (Firm Age)	-0.00615	-0.00140	-0.00773*	0.0128*
	(0.00389)	(0.00337)	(0.00402)	(0.00689)
	0.114	0.678	0.0552	0.0636
Firm Z-score	-0.000169	0.000225	1.45e-05	3.62e-05
	(0.000167)	(0.00115)	(0.000193)	(0.000319)
	0.313	0.844	0.940	0.910
ROE	3.28e-05	0.000440	-0.000636	0.000930
	(0.00118)	(0.00167)	(0.00167)	(0.00117)
	0.978	0.792	0.703	0.428
Bank Controls				
Excess Coverage Ratio	-1.57e-05	-1.40e-05	-6.56e-05	1.11e-05
	(6.78e-05)	(4.76e-05)	(6.99e-05)	(4.63e-05)
	0.817	0.769	0.349	0.811
Loan Growth	-0.000235	-0.000258	-8.36e-05	-0.000295
	(0.000335)	(0.000276)	(0.000282)	(0.000305)
	0.484	0.349	0.767	0.334
Large Exposures	0.000110	-0.000164	-0.000212*	6.44e-05
	(0.000135)	(0.000118)	(0.000118)	(0.000135)
	0.413	0.165	0.0747	0.634
Impairment Ratio	0.00774	0.00550	0.00862	0.00337
	(0.00672)	(0.00414)	(0.00637)	(0.00435)
	0.250	0.184	0.177	0.438
Observations	916	1,313	890	1,339
R-squared	0.030	0.015	0.042	0.013
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.00173	-0.00803	0.00833	-0.00869

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 25: Robustness Assets Growth (Z-score)

VARIABLES	(1) Δ Assets Small	(2) Δ Assets Large	(3) Δ Assets Young	(4) Δ Assets Old
Z-score Bank (Lag2)	-0.0263	-0.0113	-0.00331	-0.0243
	(0.0607)	(0.0145)	(0.0374)	(0.0362)
	0.665	0.437	0.930	0.502
Firm Controls				
Log (Employees)	0.0305	5.29e-05	0.00500	0.00561
	(0.0381)	(0.00784)	(0.0145)	(0.0135)
	0.424	0.995	0.731	0.679
Log (Firm Age)	-0.0420	-0.00610	-0.0173	-0.0369
	(0.0332)	(0.0132)	(0.0306)	(0.0403)
	0.207	0.645	0.571	0.361
CASH FLOW	-0.0313	0.0603	-0.0148	-0.00976
	(0.269)	(0.0915)	(0.153)	(0.327)
	0.908	0.510	0.923	0.976
Leverage	-0.207*	0.00810	-0.0809	-0.152
	(0.121)	(0.0477)	(0.0995)	(0.0968)
	0.0870	0.865	0.417	0.117
Bank Controls				
Excess Coverage Ratio	-1.22e-05	3.83e-05	-0.000303	0.000374
	(0.000441)	(0.000159)	(0.000313)	(0.000291)
	0.978	0.810	0.333	0.199
Loan Growth	0.000206	-0.000639	-0.000496	0.000104
	(0.00292)	(0.00110)	(0.00208)	(0.00160)
	0.944	0.563	0.811	0.948
Large Exposures	0.000831	-0.000283	0.000283	6.34e-06
	(0.000874)	(0.000335)	(0.000466)	(0.000674)
	0.343	0.399	0.544	0.992
Impairment Ratio	-0.0387	0.00751	-0.0379	0.0147
	(0.0416)	(0.0140)	(0.0281)	(0.0255)
	0.353	0.593	0.179	0.564
Observations	485	675	496	664
R-squared	0.047	0.042	0.042	0.040
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.00673	0.00393	-0.0137	-0.00124

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 26: Robustness Asset Growth (Injunction)

VARIABLES	(1) Δ Assets Small	(2) Δ Assets Large	(3) Δ Assets Young	(4) Δ Assets Old
Injunction(Lag2)	-0.166**	0.0113	-0.101	-0.0542
	(0.0797)	(0.0243)	(0.0623)	(0.0491)
	0.0384	0.643	0.107	0.271
Firm Controls				
Log (Employees)	0.0277	5.49e-05	0.00460	0.00486
	(0.0375)	(0.00785)	(0.0140)	(0.0135)
	0.460	0.994	0.743	0.718
Log (Firm Age)	-0.0409	-0.00744	-0.0181	-0.0333
	(0.0312)	(0.0134)	(0.0297)	(0.0394)
	0.191	0.578	0.543	0.398
CASH FLOW	-0.0380	0.0610	-0.0117	-0.0123
	(0.265)	(0.0917)	(0.152)	(0.326)
	0.886	0.506	0.939	0.970
Leverage	-0.210*	0.00755	-0.0780	-0.155
	(0.120)	(0.0478)	(0.0985)	(0.0979)
	0.0821	0.875	0.429	0.114
Bank Controls				
Excess Coverage Ratio	-6.11e-05	9.91e-06	-0.000394	0.000338
	(0.000388)	(0.000148)	(0.000284)	(0.000256)
	0.875	0.947	0.166	0.188
Loan Growth	-9.90e-05	-0.000834	-0.000271	-0.000434
	(0.00263)	(0.00107)	(0.00189)	(0.00141)
	0.970	0.436	0.886	0.758
Large Exposures	0.000412	-0.000235	6.18e-05	-0.000219
	(0.000838)	(0.000341)	(0.000463)	(0.000758)
	0.624	0.492	0.894	0.773
Impairment Ratio	-0.0372	0.00178	-0.0247	0.00256
	(0.0342)	(0.0128)	(0.0234)	(0.0173)
	0.277	0.889	0.291	0.882
Observations	485	675	496	664
R-squared	0.059	0.042	0.047	0.041
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.00512	0.00372	-0.00846	0.000568

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 27: Robustness Employees (Z-score)

VARIABLES	(1) Δ Employees Small	(2) Δ Employees Large	(3) Δ Employees Young	(4) Δ Employees Old
Z-score Bank (Lag2)	**0.0150**	**-0.00596**	**-0.0199**	**0.00690**
	(0.0171)	(0.0132)	(0.0171)	(0.0159)
	0.382	0.653	0.246	0.665
Firm Controls				
Log (Total Assets)	-0.00957	-0.0183	-0.000127	-0.0460
	(0.0109)	(0.0168)	(0.00425)	(0.0413)
	0.382	0.279	0.976	0.267
Log (Firm Age)	-0.0171	-0.0202	-0.0288**	0.0129
	(0.0109)	(0.0140)	(0.0138)	(0.0423)
	0.119	0.151	0.0378	0.761
CASH FLOW	-0.0106	0.0566	0.0268	0.0304
	(0.0190)	(0.0506)	(0.0389)	(0.0308)
	0.578	0.264	0.491	0.325
Leverage	-0.0193	-0.0423	-0.0394	-0.0289
	(0.0416)	(0.0637)	(0.0471)	(0.0632)
	0.643	0.507	0.404	0.648
Bank Controls				
Excess Coverage Ratio	-0.000236	0.000132	9.12e-05	8.83e-05
	(0.000159)	(0.000129)	(0.000163)	(0.000220)
	0.139	0.309	0.576	0.689
Loan Growth	-0.000828	0.000197	7.62e-06	-0.000518
	(0.00124)	(0.00113)	(0.00101)	(0.00134)
	0.505	0.861	0.994	0.699
Large Exposures	3.39e-05	0.000163	8.33e-05	0.000177
	(0.000338)	(0.000330)	(0.000245)	(0.000453)
	0.920	0.623	0.734	0.696
Impairment Ratio	0.00915	-0.0153	0.000525	-0.0153
	(0.0180)	(0.0119)	(0.0153)	(0.0130)
	0.611	0.203	0.973	0.242
Observations	341	485	368	458
R-squared	0.052	0.027	0.052	0.052
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.0265	-0.0285	-0.0236	-0.00788

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 28: Robustness Employees (Injunction)

VARIABLES	(1) Δ Employees Small	(2) Δ Employees Large	(3) Δ Employees Young	(4) Δ Employees Old
Injunction	-0.0345	-0.0568	0.0199	-0.0948
	(0.0357)	(0.0794)	(0.0515)	(0.0706)
	0.336	0.475	0.699	0.180
Injunction(Lag)	-0.0246	-0.0235	-0.0635	-0.0150
	(0.0240)	(0.0323)	(0.0453)	(0.0218)
	0.305	0.469	0.162	0.493
Injunction(Lag2)	0.0336	-0.0364	-0.0216	-0.0220
	(0.0224)	(0.0364)	(0.0368)	(0.0405)
	0.134	0.319	0.558	0.588
Firm Controls				
Log (Total Assets)	-0.00731	-0.0168	0.000147	-0.0443
	(0.0110)	(0.0151)	(0.00437)	(0.0400)
	0.509	0.269	0.973	0.269
Log (Firm Age)	-0.0119	-0.0194	-0.0296**	0.00607
	(0.0107)	(0.0137)	(0.0133)	(0.0382)
	0.268	0.157	0.0273	0.874
CASH FLOW	-0.00838	0.0579	0.0292	0.0294
	(0.0191)	(0.0511)	(0.0413)	(0.0296)
	0.662	0.259	0.480	0.321
Leverage	-0.0222	-0.0485	-0.0380	-0.0383
	(0.0428)	(0.0680)	(0.0463)	(0.0662)
	0.604	0.476	0.413	0.563
Bank Controls				
Excess Coverage Ratio	-0.000257	8.98e-05	4.89e-06	0.000129
	(0.000174)	(0.000125)	(0.000145)	(0.000217)
	0.141	0.474	0.973	0.554
Loan Growth	-0.000379	0.000570	-0.000373	0.000571
	(0.00112)	(0.000916)	(0.000979)	(0.00112)
	0.734	0.534	0.704	0.611
Large Exposures	0.000236	0.000297	-3.87e-05	0.000775
	(0.000380)	(0.000283)	(0.000269)	(0.000484)
	0.535	0.295	0.886	0.110
Impairment Ratio	0.0131	-0.0183	-0.00234	-0.0190
	(0.0154)	(0.0127)	(0.0130)	(0.0154)
	0.396	0.153	0.857	0.220
Observations	341	485	368	458
R-squared	0.060	0.030	0.060	0.061
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	-0.0247	-0.0291	-0.0208	-0.00241

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 29: Robustness Investments (Z-score)

VARIABLES	(1) Investments Small	(2) Investments Large	(3) Investments Young	(4) Investments Old
Z-score Bank (Lag)	-0.00240	0.0147	-0.0830	0.0763
	(0.0697)	(0.0441)	(0.0611)	(0.0541)
	0.973	0.740	0.174	0.159
Firm Controls				
Log (Total Assets)	0.202**	-0.0492	0.0337*	-0.0446
	(0.0894)	(0.0612)	(0.0197)	(0.0885)
	0.0245	0.422	0.0879	0.614
Log (Firm Age)	0.00316	-0.0623	0.0483	-0.0272
	(0.0538)	(0.0451)	(0.0457)	(0.127)
	0.953	0.168	0.290	0.830
ROE	0.0299	-0.0194	0.00337	0.00751
	(0.0373)	(0.0553)	(0.0285)	(0.0639)
	0.422	0.726	0.906	0.906
Cash holdings	0.142	-0.0309	0.0662	-0.0701
	(0.166)	(0.113)	(0.198)	(0.118)
	0.393	0.785	0.738	0.553
Leverage	0.0558	-0.475*	0.0775	-0.444
	(0.203)	(0.248)	(0.203)	(0.270)
	0.784	0.0562	0.702	0.100
CASH FLOW	0.570	0.204	0.235	0.769*
	(0.374)	(0.181)	(0.222)	(0.445)
	0.128	0.262	0.290	0.0842
Bank Controls				
Excess Coverage Ratio	0.00126	0.000106	0.00111	0.000357
	(0.000820)	(0.000351)	(0.000721)	(0.000443)
	0.124	0.764	0.124	0.420
Loan Growth	-0.00828**	-0.000556	-0.00484*	-0.00311
	(0.00329)	(0.00185)	(0.00259)	(0.00251)
	0.0120	0.763	0.0621	0.216
Large Exposures	0.000998	-0.00102	0.000752	-0.00192
	(0.00155)	(0.00145)	(0.000977)	(0.00186)
	0.519	0.481	0.442	0.303
Impairment Ratio	-0.0213	0.00504	-0.0127	0.00278
	(0.0191)	(0.0107)	(0.0133)	(0.0129)
	0.265	0.639	0.342	0.829
Observations	1,477	1,807	1,366	1,918
R-squared	0.057	0.020	0.021	0.045
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.0388	0.00295	-0.000742	0.0294

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 30: Robustness Investments (Injunction)

VARIABLES	(1) Investments Small	(2) Investments Large	(3) Investments Young	(4) Investments Old
Injunction	0.0599	-0.0390	0.0327	0.0488
	(0.135)	(0.0714)	(0.125)	(0.100)
	0.658	0.586	0.793	0.627
Injunction(Lag)	0.0238	-0.105	-0.0544	0.0374
	(0.178)	(0.142)	(0.216)	(0.126)
	0.893	0.462	0.801	0.767
Injunction(Lag2)	-0.0984	-0.148	0.0294	-0.159
	(0.140)	(0.111)	(0.127)	(0.115)
	0.481	0.183	0.817	0.169
Firm Controls				
Log (Total Assets)	0.267**	0.00551	0.0384	0.0617*
	(0.104)	(0.0192)	(0.0260)	(0.0359)
	0.0104	0.774	0.140	0.0857
Log (Firm Age)	-0.0191	-0.0402	-0.00476	-0.0619
	(0.0519)	(0.0471)	(0.0411)	(0.145)
	0.713	0.394	0.908	0.669
ROE	0.0219	0.0304	-0.0145	0.0507
	(0.0455)	(0.0224)	(0.0388)	(0.0459)
	0.630	0.175	0.709	0.270
Cash holdings	0.227	0.0529	0.0880	0.0857
	(0.192)	(0.130)	(0.238)	(0.114)
	0.237	0.683	0.711	0.453
Leverage	0.0828	-0.361*	0.101	-0.222
	(0.238)	(0.187)	(0.255)	(0.222)
	0.728	0.0535	0.691	0.317
CASH FLOW	0.718	-0.00142	0.405	0.752
	(0.452)	(0.244)	(0.333)	(0.537)
	0.113	0.995	0.224	0.162
Bank Controls				
Excess Coverage Ratio	0.00150**	-8.18e-06	0.000900	0.000805**
	(0.000743)	(0.000246)	(0.000899)	(0.000407)
	0.0445	0.973	0.317	0.0485
Loan Growth	-0.0113***	-0.000849	-0.00730**	-0.00456*
	(0.00389)	(0.00149)	(0.00320)	(0.00262)
	0.00390	0.569	0.0229	0.0826
Large Exposures	-0.00107	-0.000976	0.000156	-0.00331
	(0.00223)	(0.000928)	(0.00135)	(0.00207)
	0.633	0.293	0.908	0.110
Impairment Ratio	-0.0385	0.0399	-0.0249	0.0414
	(0.0423)	(0.0266)	(0.0336)	(0.0374)
	0.362	0.134	0.458	0.268
Observations	1,199	1,423	1,032	1,590
R-squared	0.079	0.017	0.029	0.061
Industry FE	YES	YES	YES	YES
Region FE	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Adjusted R-squared	0.0549	-0.00564	-0.00152	0.0412

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 31: Leverage yearly (Z-score)

VARIABLES	(1) Leverage 2009	(2) Leverage 2010	(3) Leverage 2011	(4) Leverage 2012	(5) Leverage 2013
Bank Z-score (Lag)	-0.000371	0.000881	-0.00730	-0.00326	-0.00225
	(0.0141)	(0.0236)	(0.0190)	(0.0106)	(0.00741)
	0.979	0.970	0.700	0.760	0.761
Firm Controls					
Log (Total Assets)	0.00817*	0.00764*	0.00499	-0.00152	-0.00231
	(0.00489)	(0.00419)	(0.00532)	(0.00507)	(0.00448)
	0.0947	0.0686	0.349	0.764	0.606
Log (Firm Age)	-0.0227**	-0.0278***	-0.0306***	-0.0364***	-0.0188***
	(0.00899)	(0.00889)	(0.00973)	(0.00897)	(0.00630)
	0.0116	0.00183	0.00174	5.25e-05	0.00292
Interest Expense	-0.0389***	-0.0574***	-0.0425***	-0.0699***	-0.0500***
	(0.00275)	(0.00785)	(0.00355)	(0.0112)	(0.00401)
	0	0	0	6.49e-10	0
ROE	-0.0108	0.00654	-0.00546	-0.00310	0.00491
	(0.00894)	(0.00810)	(0.00897)	(0.00896)	(0.00618)
	0.229	0.419	0.543	0.730	0.427
Z-score Firm	-0.00232	-0.0127***	-0.00533**	-0.00544***	-0.0124***
	(0.00159)	(0.00416)	(0.00225)	(0.00197)	(0.00473)
	0.145	0.00227	0.0180	0.00596	0.00865
Bank Controls					
Excess Coverage Ratio	0.000103	0.000163	4.43e-05	0.000237	-0.000274**
	(0.000151)	(0.000185)	(0.000197)	(0.000179)	(0.000118)
	0.497	0.379	0.822	0.185	0.0201
Loan Growth	-0.00202**	0.00122	0.000888	0.00100	0.000314
	(0.00102)	(0.00163)	(0.000829)	(0.00104)	(0.000738)
	0.0483	0.455	0.284	0.333	0.670
Large Exposures	0.000377	1.73e-06	9.92e-05	0.000506	9.97e-05
	(0.000270)	(0.000281)	(0.000332)	(0.000837)	(0.000369)
	0.164	0.995	0.765	0.546	0.787
Impairment Ratio	-0.000981	-0.0245	-0.0135	-0.00587	0.00289
	(0.00201)	(0.0228)	(0.0186)	(0.00824)	(0.00296)
	0.626	0.284	0.471	0.477	0.330
Observations	798	882	997	1,301	2,421
R-squared	0.162	0.217	0.193	0.180	0.215
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.131	0.190	0.169	0.162	0.205

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Table 32: Interest Expense yearly (Z-score)

VARIABLES	(1) Interest Expense 2009	(2) Interest Expense 2010	(3) Interest Expense 2011	(4) Interest Expense 2012	(5) Interest Expense 2013
Bank Z-score (Lag)	-0.0103	0.00988	0.114	-0.0298	-0.0150
	(0.104)	(0.0928)	(0.184)	(0.0348)	(0.0233)
	0.922	0.915	0.536	0.392	0.520
Firm Controls					
Log (Total Assets)	0.0151	0.0887**	0.0276	0.0454*	0.00687
	(0.0390)	(0.0386)	(0.0316)	(0.0272)	(0.0220)
	0.699	0.0219	0.383	0.0953	0.755
Log (Firm Age)	0.168**	-0.0720*	0.182***	0.0922**	0.0491**
	(0.0752)	(0.0437)	(0.0670)	(0.0358)	(0.0227)
	0.0260	0.0996	0.00669	0.0101	0.0308
ROE	-0.00375	-0.0133	-0.0814***	-0.0328	-0.00982
	(0.0433)	(0.0143)	(0.0296)	(0.0245)	(0.0147)
	0.931	0.352	0.00602	0.181	0.504
Z-score Firm	-0.00758	-0.0127*	-0.00887	-0.0169**	-0.00139
	(0.00522)	(0.00747)	(0.00657)	(0.00796)	(0.00272)
	0.146	0.0892	0.177	0.0335	0.611
Bank Controls					
Excess Coverage Ratio	-0.000502	-0.000890*	-0.00160	-0.000582	-0.000736
	(0.000472)	(0.000475)	(0.00131)	(0.000623)	(0.000454)
	0.287	0.0613	0.222	0.351	0.105
Loan Growth	-0.00250	0.00344	-0.000590	-0.00629*	-0.00399
	(0.00621)	(0.00561)	(0.00797)	(0.00344)	(0.00323)
	0.687	0.540	0.941	0.0679	0.216
Large Exposures	-0.000393	5.02e-05	0.00615	-0.00224	0.00237
	(0.00136)	(0.00111)	(0.00428)	(0.00255)	(0.00185)
	0.772	0.964	0.151	0.379	0.201
Impairment Ratio	-0.0138	0.0796	-0.300**	0.0734*	-0.00568
	(0.0102)	(0.101)	(0.125)	(0.0410)	(0.0133)
	0.175	0.432	0.0169	0.0737	0.669
Observations	798	882	997	1,301	2,421
R-squared	0.040	0.082	0.063	0.089	0.018
Industry FE	YES	YES	YES	YES	YES
Region FE	YES	YES	YES	YES	YES
LegalForm FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES
Adjusted R-squared	0.00634	0.0515	0.0360	0.0695	0.00684

Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1), P-value below

Appendix D: Descriptive Statistics

Variable	Variation	Mean	Std. Dev.	Min	Max	Observations
Leverage	overall	.2913123	.2485506	0	1	N = 8097
	between		.2460591	0	1	n = 3827
	within		.094172	-.3580312	.9342046	T-bar = 2.11576
Interest Expense	overall	.3903514	1.395.723	0	10.625	N = 7233
	between		1.208.391	0	10.625	n = 3508
	within		.8566341	-5.980.613	9.236.245	T-bar = 2.06186
Cash holdings	overall	.2417513	.2818007	0	1	N = 7562
	between		.2734311	0	1	n = 3574
	within		.1039874	-.440335	.9325189	T-bar = 2.11584
Issued Equity	overall	-.0047147	.103293	-.5714286	.4575943	N = 4087
	between		.0842416	-.5714286	.4575943	n = 1782
	within		.0792682	-.6452544	.5097967	T-bar = 2.29349
Investments	overall	-.1571516	1.470.675	-2.350.846	4.648.649	N = 4068
	between		1.674.828	-2.350.846	4.648.649	n = 1781
	within		.8160868	-1.771.443	1.191.349	T = 2.28411
Δ Assets	overall	-.0262695	.4574523	-5.590.022	7.076.854	N = 4099
	between		.4883344	-3.680.702	6.732.898	n = 1797
	within		.2783162	-3.745.178	5.269.946	T = 2.28102
Δ Employees	overall	-.011611	.4128154	-8.600.339	5.878.017	N = 1544
	between		.4386369	-8.600.339	4.492.002	n = 754
	within		.2646616	-573.844	5.869.378	T = 2.04775

Figure 34 Dependent Variables

Variable	Variation	Mean	Std. Dev.	Min	Max	Observations
Total Assets (Log)	overall	7.384.523	1.664.439	0	2.210.279	N = 8094
	between		1.608.008	1.098.612	2.208.654	n = 3824
	within		.2715524	35.407	130.649	T-bar = 2.11663
Firm Age (Log)	overall	2.686.298	.893504	0	5.398.163	N = 8015
	between		.9732317	0	5.398.163	n = 3792
	within		.135753	1.589.756	3.976.699	T-bar = 2.11366
Firm Z-score	overall	2.283.814	1.098.192	-3.013.869	1.212.319	N = 8097
	between		1.182.873	-3.013.869	1.212.319	n = 3827
	within		5.446.682	-245.473	9.350.473	T-bar = 2.11576
Tangibility	overall	.2335517	.2839188	0	.9913736	N = 6357
	between		.2841546	0	.9913736	n = 3065
	within		.0752259	-.5078728	.9770819	T-bar = 2.07406
ROE	overall	.1690822	1.283.869	-6.222.222	6.659.574	N = 8091
	between		1.284.643	-6.222.222	6.659.574	n = 3824
	within		.7701708	-5.977.162	627.415	T-bar = 2.11585
Cash flow	overall	-.0007074	.3658796	-3.520.325	1.088.889	N = 8097
	between		.3556787	-3.520.325	1.088.889	n = 3827
	within		.2200878	-3.347.939	1.746.091	T-bar = 2.11576

Figure 35 Firm Explanatory Variables

Variable	Variation	Mean	Std. Dev.	Min	Max	Observations
Bank Z-score	overall	.4711222	.8263655	-1.476.486	3.291.413	N = 8097
	between		.7350775	-1.476.486	3.291.413	n = 3827
	within		.4834703	-2.124.111	2.736.735	T-bar = 2.11576
Injunction Group	overall	.4194146	.4934937	0	1	N = 8097
	between		.490597	0	1	n = 3827
	within		.0426836	-.2472521	1.252.748	T-bar = 2.11576

Figure 36 Bank Health Variables

Table 33 Variables prior and post winsorizing

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
Z-score Firm	8,097	2.585	38.03	-1,209	2,797
Z-score Firm (Wins)	8,097	2.284	10.98	-301.4	12.12
ROE	8,091	0.143	5.749	-240.1	115.3
ROE (Wins)	8,091	0.169	1.284	-6.222	6.660
Issued Equity	4,087	-0.0255	1.295	-79.08	16.41
Issued Equity (Wins)	4,087	-0.00471	0.103	-0.571	0.458
Tangibility	6,357	0.234	0.284	-0.0773	1.348
Tangibility (Wins)	6,357	0.234	0.284	0	0.991
Interest Expense	7,233	0.682	5.959	-20	240.7
Interest Expense (Wins)	7,233	0.390	1.396	0	10.62
Cash Holdings	7,562	0.242	0.282	-0.190	1.010
Cash Holdings (Wins)	7,562	0.242	0.282	0	1
Leverage	8,097	0.290	0.264	-7.602	1
Leverage (Wins)	8,097	0.291	0.249	0	1
Investments	4,063	-1.853	37.77	-1,397	5.915
Investments (Wins)	4,063	-0.219	1.874	-23.51	4.649
Z-score Bank	8,097	-12.40	309.6	-7,450	5.112
Z-score Bank (Wins)	8,097	0.471	0.826	-1.476	3.291
Cash flow	8,097	0.164	17.22	-159.8	1,536
Cash Flow (Wins)	8,097	-0.000707	0.366	-3.520	1.089
*A detail description of variable calculation is found in Appendix A					

Bank Control Variables Data Description

Variable		Mean	Std. Dev.	Min	Max	Observations
ExCov_~k	overall	163.7476	58.86383	25.23	1048.6	N = 9379
	between		52.15875	25.23	1048.6	n = 4283
	within		30.5235	-25.73571	333.3976	T-bar = 2.18982
Growth~k	overall	-4.3212	10.76662	-72.4	86.9	N = 9379
	between		8.546173	-72.4	86.9	n = 4283
	within		8.108097	-62.1212	55.21213	T-bar = 2.18982
Annual~k	overall	1.323644	2.72225	-4.65	48.5	N = 9379
	between		1.964677	-4.65	48.5	n = 4283
	within		2.050711	-20.52636	40.46698	T-bar = 2.18982
LargeE~k	overall	28.92566	36.76741	0	595.1	N = 9379
	between		32.00727	0	595.1	n = 4283
	within		24.16464	-156.7743	474.1807	T-bar = 2.18982

Figure 37 Descriptive statistics bank controls

The excess liquidity coverage has a mean of 163.5% across all observations which is well above the 50% minimum imposed by the FSA. The average is increasing over time, having started from below 100% in 2008 and reaching almost 200% at the end of the observed period 2013.

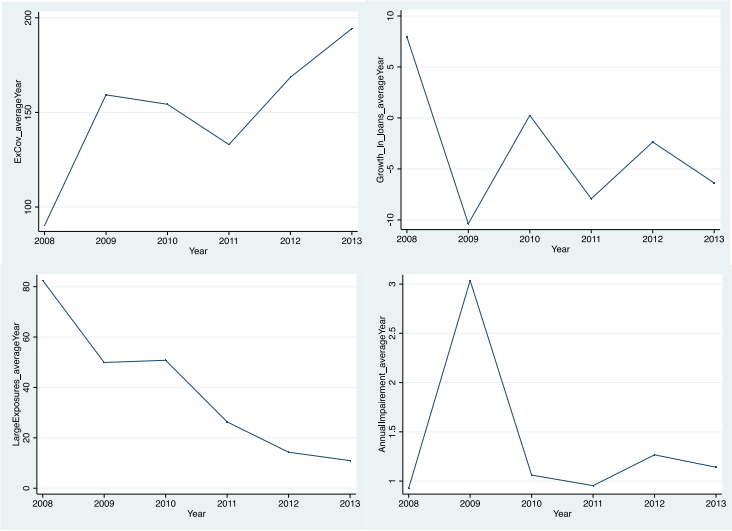


Figure 38 Bank controls average year

This implies that in terms of liquidity banks were striving and succeeding to increase the excess coverage.

The lending growth has a mean of -4.3% which is well below the 20% regulatory requirement. Thus, across the period firms reduced the amount of loans made on average. The variation in the variable across time is substantial with a minimum of -72.4% to a 86.9% maximum but even within variation, the loan growth ranges from -62.1% to 55% within timespan of 6 years or less. 2008 was the only year with positive loan growth after which banks curtailed lending as much as 10% in 2009 and continued to reduce it to a compounded 16.5% decrease of the amount of loans from 2008 to 2013.

The annual impairment ratio, used as a proxy to the exposure of the banks towards commercial property had a mean of 1.32.

Large exposures which refers to on and off balance sheet exposures in excess of secured claims and should not exceed 125% of the core capital has a mean of 28.9% across all observations and time. In 2008 the average for all banks was above 80% and over time was considerably reduced to less than 20% by 2013 showing an overall contraction of unsecured exposures for banks.