How do financial institutions react to a tax increase?*

Alexander Schandlbauer†

October 2013

Abstract

This paper empirically highlights the first order importance of taxes for the capital structure decision of financial institutions. Using a difference-in-differences methodology, I show that an increase in the local U.S. state corporate tax rate affects both sides of the banks' balance sheet. Banks which are exposed to a tax increase raise their non-depository debt by approximately 5.9% one period prior to the enactment of the tax change. The overall average however hides a large cross sectional heterogeneity: better-capitalized banks have the financial flexibility to increase their debt and thus to benefit from an enlarged tax shield. Worse-capitalized banks instead alter the asset side of their balance sheet: consistent with the notion that a tax increase induces a reduction of their available after-tax cash flow, these banks constrain the expansion of customer loans.

Keywords: financial institution, capital structure, corporate income tax
JEL classification: G21, G30, G32

*I am grateful to my advisors Christian Laux and Gyöngyi Lóránth as well as to Maria Chaderina, András Danis, Özlem Dursun, Rüdiger Fahlenbrach, Thomas Gehrig, Xavier Giroud, Florian Nagler, Daniel Urban (discussant), Toni Whited, Josef Zechner and Michael Zierhut for helpful discussions and comments. I also thank the seminar participants of the 20th Annual Meeting of the German Finance Association (DGF) and the 2013 VGSF Conference.

†Vienna Graduate School of Finance, Welthandelsplatz 1, D4.4.171, 1020 Vienna, Austria, Tel: +43 1 31336 5074, Email: alexander.schandlbauer@vgsf.ac.at

1 Introduction

The recent financial crisis has led to an increased interest in the regulation and taxation of financial institutions.[1] However, while there has been an active discussion about taxes for non-financial companies (e.g. Graham (2006) and Hanlon & Heitzman (2010) provide recent reviews), the role which taxes play for banks has so far received very limited attention in the literature, both empirically and theoretically.[2]

This paper focuses on one specific form of taxation, namely on corporate taxes, and seeks to answer the question of whether and how banks adjust both their liability and their asset side of the balance sheet once they are facing an increase in their corporate tax rate. Answering such a question is interesting as it may have implications which go beyond the banks' individual financial decisions: qualifying and also quantifying the importance of corporate taxes may facilitate both the regulators as well as the politicians understanding of the (unintended) consequences of a tax increase.

I make two important contributions in this paper. First, the analysis highlights the role and the significance of corporate taxes for the financial sector. While corporate taxes have not been the primary focus of the existing literature, this paper emphasizes that banks alter both sides of the balance sheet once they are exposed to a corporate tax increase. Hence, one can conclude that corporate taxes are in fact of 1^{st} order importance for banks. Second, the financial health of the banks has a significant influence on their reaction to a tax increase. The differentiation between being financially better-capitalized and being worse-capitalized matters significantly, as the two groups respond very differently: better-capitalized banks expand their non-depository leverage ratio and thus use their financial flexibility to benefit from an enlarged tax shield. On the contrary, worse-capitalized banks instead reduce their customer loans expansion as the tax increase can be regarded as a negative shock to the banks' after-tax cash flow.

To analyze how financial institutions alter their capital structure once they are exposed to a corporate tax increase, a number of empirical obstacles need to be overcome. The main problem, which many empirical papers analyzing the influence of taxes on the capital structure have, is that causal statements are often difficult. One of the reasons is the simultaneity of corporate decisions; hence, the marginal tax rate and the com-

[1] A recent IMF report to the G20 focuses on the taxation of the financial sector and provides a detailed overview of various proposed contributions of financial institutions in different countries (see Claessens et al. (2010)).

[2] One recent exception is a descriptive analysis by Admati et al. (2011), in which the authors highlight that the tax shield of debt may be of relevance for the banking sector as well. Nevertheless, existing studies have primarily focused their attention on bank specific frictions in analyzing different capital structure decisions of banks; the focus was not on taxation. At the same time, it is also well known that financial institutions face regulatory constraints which make their capital structure decisions distinct from those of non-financial companies.

panies' actions are endogenous. This paper uses a natural experiment to circumvent this problem, namely local corporate tax increases. Most U.S. states levy some form of corporate income or franchise tax on financial companies which are active within the state. Moreover, over the past years, a number of states have increased their tax rate or have introduced additional surcharge taxes. Therefore, banks which are affected by a tax increase can be compared to those which are *not* affected.

A further empirical challenge is to determine where a bank is actually paying its local corporate taxes. While previous studies analyzing non-financial companies rely on the location of the headquarter, this may introduce a bias, as companies are generally required to pay their state income tax wherever they are active and generate profits. In this paper, a more precise proxy is used, namely the number of branches as well as their geographical location, to determine where a financial institution is paying the majority of its local taxes. I consequently employ a difference-in-differences estimation approach. To ensure that all institutions have similar characteristics in absence of the law change, treated banks (which are exposed to a tax increase) are matched to control banks (which are *not* exposed to a tax increase) two years prior to a tax change on a large number of dimensions. Additionally, both groups of banks are required to be active in the same broad geographical region to reduce the impact of unobservable local economic conditions.

I first discuss the relationship between taxes and the financing decision of banks in more detail: compared to banks which are active in states that do not increase the taxes, treated banks significantly increase their non-depository leverage ratio by 5.9% (or alternatively by $11.9 million given the mean amount of the total non-depository debt of $201 million). The main intuition behind this finding is that banks have the ability to benefit from an enlarged tax shield, which exists due to the higher corporate tax rate. Interestingly, banks increase their debt already one year prior to the final enactment, indicating that they anticipate the tax change. Furthermore, the analysis highlights that the overall average hides a large cross-sectional heterogeneity as not all treated banks react in a similar fashion. It is primarily better-capitalized banks which have the financial flexibility to increase their leverage further, whereas no significant effect is found for financially worse capitalized banks.[3] Moreover, the analysis further documents that better-capitalized treated banks also decrease their equity financing by roughly 3.0% subsequent to the tax increase which can be attributed to an increase in the bank's preferred stock repurchases. Therefore, a local tax increase induces banks,

[3]The distinction between financially better- and worse-capitalized banks is made by comparing the distance to the overall regulatory constraint. Banks which are closer to their regulatory boundary, defined as having an equity-to-assets ratio below the median, are regarded worse-capitalized (and hence financially more constrained), whereas bank which are further away are better- (or well-) capitalized.

which are financially well-off, to shift their financing activities towards using a larger amount of debt.

Examining the asset side of the balance sheet and comparing again treated and non-treated banks, I find that those which are affected by the tax increase, slow down their customer loans expansion by 2.3%. The distinction between better- and worse capitalized banks is again beneficial: the customer loans of worse-capitalized banks grow less whereas no significant change is found for better-capitalized banks. Hence, this finding reaffirms that depending on their financial health and flexibility, banks react differently. Moreover, this asymmetry further enables a differentiation between a demand and a supply side effect as a change in the demand of customer loans would likely affect both financially better- and worse-capitalized banks in a similar fashion. Therefore, using a sample of financial institutions and the fact that they are subject to regulatory boundaries enables a differentiation between better- and worse-capitalized banks and, as a result of this, a separation of financing and investing activities. Thus, the analysis highlights that subsequent to a tax increase, worse-capitalized banks, which do not have the financial flexibility to increase their non-depository debt further, are induced to reduce their loans expansion.

Last, the question whether financial institutions also alter the riskiness of their asset side is analyzed. While some weak evidence suggests that better-capitalized banks increase their fraction of risk-weighted assets over total assets in the year of the tax increase, other proxies for risk, such as the amount of customer loan charge-offs or of risky assets, do not show a significant difference between treated and control banks. This finding can be can be attributed to the general ability of banks to quickly change the risk profile in a number of different ways, such as changing the composition or amount of trading assets. Hence, banks may not wait for a tax increase to occur, if they want to alter their asset risk.

While the natural experiment seeks to alleviate endogeneity concerns, one possible limitation of the above findings could be that unobservable, state specific, effects may influence the analysis. However, such explanation is unlikely to be the main driver of the results. First, the empirical specification compares banks which are active within the same broad geographical region and includes state specific control variables to mitigate such concerns. Second, using a sub-sample of Chapter-S banks as a control group leads to similar results. The advantage Chapter-S banks is that they are not subject to corporate taxation. Hence both the control and the treatment group are active within the same state and thus any state-specific effect influences both groups. Third, a placebo test highlights that no significant results are found when a directly neighboring state is chosen instead. Last, a number of sample splits and alternative

regression specifications further illustrate the stability of the results.

The remainder of the paper is organized as follows. The next section reviews the related literature and develops the main hypotheses. Section 3 describes the sample selection and the empirical methodology and Section 4 proceeds with a discussion of the main results. Section 5 reports a large number of different robustness checks. Last, Section 6 concludes.

2 Related Literature and Hypothesis Development

2.1 Related empirical literature

While some recent empirical papers examine the capital structure of financial institutions (e.g. Gropp & Heider (2010)), the main focus of the analysis has so far not been on (corporate) taxes. Conversely, the literature discussing the influence of taxes on the capital structure of non-financial companies is vast (Graham (2006)).

A few early papers analyze the Tax Reform Act of 1986 which reduced the (marginal) corporate income tax. These papers discuss the broad effects that the tax reform had on the banking industry and look at e.g. the overall tax burden, the tax rates paid or the bank lending (e.g. Buynak (1987), Neubig & Sullivan (1987) or Kuprianov (1997)). However, a general problem with using such a nation wide shock is to identify the appropriate control group since the Reform Act was a federal law affecting all companies equally.[4,5] More recently, de Mooij & Keen (2012) use a panel estimation of international data to document a positive relationship between the leverage ratio of a bank and its corporate income tax. Yet one possible disadvantage of using such estimation approach is that a causal interpretation is difficult because of endogeneity concerns. A concurrent analysis by Hemmelgarn & Teichmann (2013) further uses multinational data and documents a positive relationship between tax changes and the leverage decision of banks. However, one potential drawback of international studies is that foreign banks may not be a suitable control group.

To circumvent such endogeneity concerns and the problem of an ill-defined control group, I use corporate tax changes on a state basis instead of the federal basis. In general, different U.S. state law changes have been a relatively popular instrument to examine several capital structure decisions. Bertrand & Mullainathan (2003) discuss the goals of managers by using changes in the states anti-takeover laws. More

[4]Moreover, a further difficulty is that the reform had multiple side aspects, such as altering the amount of tax exempt securities, changing the minimum tax rate or the investment tax credit, which make a clear cut analysis difficult.

[5]These early papers, in fact, often do not use any comparison group.

recently, Giroud & Mueller (2010) reexamine the passage of states anti-takeover laws and analyze the firms' reactions with respect to their corporate governance. Focusing on tax changes, a recent working paper by Heider & Ljungqvist (2013) also analyzes state tax law changes and hence uses a very similar natural experiment. However the assessment is conducted for non-financial companies only. The authors focus on asymmetries in the firms' leverage decision and show that firms increase their leverage ratio upon a local tax increase whereas no reduction occurs upon a tax decrease. My analysis differs from this paper in a number of dimensions, most notably the focus lies on examining the reaction of financial institutions on a tax increase only.[6] Due to the fact that banks face regulatory constraints, the focus on the financial sector further facilitates the distinction between financially better-capitalized and worse-capitalized companies. Moreover, this paper examines capital structure related decisions which go beyond leverage, such as loans and risk taking. Last, using the number and location of the banks' individual branches instead of relying on the headquarter enables a more precise examination of where banks actually pay their local taxes.

Some further empirical papers used international data to analyze the connection between taxes and the debt-equity choice of non-financial companies. Panier et al. (2012) exploit the introduction of a tax provision in Belgium which encourages the usage of equity financing and find that after the passage of the law, firms increase their equity-to-assets ratio and become more capitalized. Wu & Yue (2009) show that Chinese companies increase their leverage subsequent to a cancellation of a tax rebate. Using a different econometric approach, Barakat & Rao (2012) highlight that companies use more leverage in countries where a corporate income tax exists.

Besides the relationship between leverage and taxes, Asker et al. (2012) analyze the investment decision of non-financial companies by again using the U.S. state's tax change as a natural experiment. The authors show that while private firms adjust their investments subsequent to tax changes, public firms do not seem to react which is attributed to agency conflicts prevailing in public companies. Using a different econometric framework, Djankov et al. (2010) look at a large cross section of 85 countries in 2004 and highlight that taxes affect the entrepreneurial activity and the aggregate investment of manufacturing industries.

[6]The main argument in favor of focusing on tax increases is that tax decreases might be subject to endogeneity concerns as companies may have an incentive lobby for tax reductions. Sub-Section 3.3 discusses the general validity of using tax increases as a natural experiment.

2.2 Hypothesis development

Taxes have long been recognized as one major factor influencing the capital structure of companies, the main reason being that interest payments are tax deductible while payments to equity holders are not. As a consequence, the standard trade-off theory predicts that, all else equal, the higher the corporate tax rate is, the higher the leverage ratio of a company will be. Looking at financial institutions, their capital structure has also come under increasing attention in the past couple of years. Different authors have shown that similar to non-financial companies, banks have a target leverage ratio from which they may deviate for some time because of adjustment costs (e.g. Flannery & Rangan (2008)). However, most theoretical models, which analyze the capital structure of banks, do not focus on the tax shield as the main benefit of debt, and instead discuss bank specific channels, such as the liquidity risk, the degree of competition in the loan market or (implicit) government guarantees. Nevertheless, in a recent descriptive paper, Admati et al. (2011) argue that given the high levels of leverage, which financial companies typically have in comparison to non-financial companies, the tax shield might actually play an important role in the financial companies' capital structure adjustments.

One distinctive characteristic of financial institutions is that they are facing regulatory constraints, which demand them to hold both a minimum amount of regulatory capital as well as a maximum amount of leverage. In fact, there exist different regulatory requirements which banks need to satisfy: the Federal Deposit Insurance Corporation (FDIC) treats banks as being under-capitalized if either their Tier 1 ratio (Tier 1 capital divided by risk-weighted assets) falls below 4% or if their total risk-based capital ratio (total risk based capital divided by risk-weighted assets) is smaller than 8%. Moreover, the FDIC maintains a maximum Tier 1 leverage ratio (Tier 1 capital divided by total assets) requirement of 3-4%, depending on the banks' regulatory rating. Blum (2008) shows theoretically that such an additional requirement, which does not depend on how banks chose and treat the riskiness of their assets, can help mitigate risk taking of banks. The empirical literature, however, has highlighted that these constraints are often not binding. Banks commonly hold more capital (and less leverage) than required (Flannery & Rangan (2008)). Nevertheless, banks which are closer to their regulatory constraint may behave differently compared to banks which are not directly affected by the constraint. Ergungor et al. (2010) for example document differences in the asset growth and dividend policy between well-capitalized and under-capitalized banks prior to seasoned equity offerings. In general, well-capitalized banks are more likely to have discretion over their activities compared to worse-capitalized banks, whose regulatory boundary may be more stringent.

Therefore, a tax increase is expected to affect better- (or well-) capitalized banks differently compared to worse-capitalized ones. While well-capitalized banks are likely to have the financial flexibility to increase their leverage and thus benefit from an enlarged tax shield, worse-capitalized banks may not be able to increase their leverage ratio further. Hence, one can summarize the first hypothesis in the following way:

Hypothesis 1: Due to the tax shield of debt, an increase in the corporate taxation is expected to cause better-capitalized banks to increase their leverage, whereas worse-capitalized banks may not have the financial flexibility to do so.

The next question which arises is what additional effects tax changes may have on the capital structure. Besides the leverage ratio, taxes also influence the asset side of the balance sheet and hence the companies' investment decisions. In general, a local tax rise leads to an increase in the user cost of capital for firms operating in that state or as Cohen et al. (1999) note to an increase in the 'before-tax marginal product of capital necessary to yield an acceptable after-tax rate of return to investors'.[7] Hence, a tax increase negatively influences the after-tax available cash flow of companies and 'can thus be viewed as shocks to firms' after-tax returns on investment and thus to their investment opportunity sets' (Asker et al. (2012)).

Therefore, all else equal, an increase in the corporate tax rate leads to a reduction of the bank's cash flow. However, the reaction to such idiosyncratic adverse shock may again depend on bank's financial strength. The intuition is that worse-capitalized banks may be induced to reduce their loans expansion since they may not have the financial flexibility to react to a tax rise by further increasing their leverage and hence cannot benefit from an enlarged tax shield. On the contrary, a tax increase is less likely to affect the asset side of well-capitalized banks. Therefore, the following hypothesis summarizes the possible effect which taxes can have on the loans decision of banks:

Hypothesis 2: An increase in the tax rate acts as a adverse shock to the after-tax cash flow and is thus expected to negatively affect the loans decision of financially worse-capitalized banks.

Last, taxes may also influence the riskiness of the asset side, an aspect which is often ignored in discussions about the user cost of capital (Hassett & Hubbard (2002)). Cullen & Gordon (2007) develop a theoretical model and show empirically that an

[7] A corporate tax increase also causes the depreciation deductions to be more valuable, which reduces the user cost of capital, yet this effect is typically negligible (e.g. Cohen & Cummins (2006)).

entrepreneur's incentives to engage in risk taking can be influenced by differences in the business and personal income tax rates. For financial institutions however, the influence of taxes on the riskiness of the asset side may not be so straightforward. The main reason is that financial institutions typically have numerous possibilities to quickly influence their riskiness, such as altering their traded assets. Hence, a tax increase may, or may not, evoke banks to alter their risk profile.

3 Empirical Design and Sample Selection

3.1 Corporate state taxes

In general, in addition to the federal corporate income tax, all corporations are required to pay local state taxes in states where they are active or where they are deriving income from.[8] Financial institutions may be charged a corporate income tax or they may be subject to an alternative tax regime, such as a bank franchise tax. The difference between the income tax and the franchise tax is that the former is based on income whereas the later is based on the 'net worth'. As of 2012, three states (NV, WA and WY) levy no corporate income tax, however, some states, charge different rates for financial institutions: for example, SD charges up to 6% on a bank's net income whereas non-financial institutions are not subject to an income tax. On the contrary, five states (KY, MI, NE, PA, VT) do not levy an income tax on financial institutions whereas they do charge an income tax for non-financial companies (however they often do levy a bank franchise tax in lieu).

As a first step, one needs to determine where a financial company is required to pay its state income tax. This is generally referred to as the 'nexus' and different states have different definitions of what exactly determines the nexus. In fact, it is often difficult to determine where a company is precisely earning its profits. For example, financial institutions may generate some revenues from a trust, which itself generates income from several different states. Hence, the question of the economic nexus is hard to answer. Serether et al. (2011) notice that because of such considerations most states determine the nexus according to whether the financial company is doing any business or is deriving any income from sources within a certain state. Moreover a further issue that complicates matters is the apportionment of the different tax rates of the financial institution. In the case at hand, I simplify matters and define the nexus of a bank in

[8]The exception are S-Corporations, which have a small and limited number of shareholders and which pass the income tax on to their shareholders. There exist very few bank holding companies which are S-Corporations; these are excluded from the main sample. The Robustness Section 5 provides a detailed analysis about S-Corporations.

terms of the location of the company's branches. As a primary state of operation, the state in which the company has at least 75% of its branches is chosen (separately in each year); hence very dispersed banks which do not have such a geographical focus, are not part of the analysis.[9] Unfortunately, the branch specific profits (or net income), which is generally the basis to compute the local corporate state tax, is typically unavailable. An alternative approach would be to use the state where the company is headquartered, however, this assumes that the company is deriving the majority of its income (and hence pays most state taxes) within this particular state. The approach of using the number of branches is able to depict a more detailed analysis.

Descriptive statistics

Different U.S. states charge a minimum corporate tax rate and often have multiple tax brackets. For simplicity, however, the analysis focuses on changes in the top tax bracket.[10] Moreover, changes in the surcharge tax, which my be charged in addition to the regular income or franchise tax rate, are also included.

Between 2000 and 2011, 13 tax increases occurred in 11 different states. Table 1 depicts the summary statistics: six states increased their corporate income or franchise tax by an average of 1.04 percentage points. The average local tax rate one year prior to the tax increase was 6.4%, hence the tax increases correspond to an increase of 16.3% relative to the previous year. An additional five states introduced and one state increased complementary surcharge taxes, which are payable on the tax liability a company. The average size of such surcharge tax is 9%. Moreover, MI introduced a corporate tax on the net-capital of banks in 2008. In general, the different tax increases are spread out, even though some clustering occurs in the latest financial crisis period of 2008 and 2009.

3.2 Empirical design

A difference-in-differences estimation approach is used to examine how corporate tax changes influence the capital structure of financial institutions: this paper exploits a staggered natural experiment by looking at several tax law increases in different states in the United States. The first difference corresponds to the within-firm changes (of the variables of interest) and eliminates firm specific fixed effects. The second difference aims at removing any confounding factors by examining the difference between banks which experience a tax increase and those which do not. Specifically, I estimate the

[9] The Robustness Section 5 examines alternative thresholds.

[10] This simplifying assumption is not restrictive as all banks are listed bank holding companies, which are generally not very small. Section 4.1 provides a description of the data.

following regression, where the main coefficient of interest is β_1 which measures the effect of an increase in the tax rate.

$$\Delta y_{i,t} = \alpha + \beta_1 \, Treat_i + \beta_2 \, \Delta X_{i,t-1} + \epsilon_{i,t} \tag{1}$$

The variable $Treat$ is an indicator variable which is equal to one if a tax increase occurs in a given state and year and zero otherwise.[11] The precise description of which banks are part of the control group is provided in Sub-Section 3.5 below. $\Delta y_{i,t}$, denotes the first difference of the dependent variable of interest and is calculated either as $(y_t - y_{t-1})$ / $total\ assets_{t-1}$ or alternatively as the change in the leverage ratio, $(y_t$ / $total\ assets_t) - (y_{t-1}$ / $total\ assets_{t-1})$.[12] The time subscript t corresponds to the year a tax increase is enacted. Due to data limitations, the year when the new tax is levied on the bank and is thus effective, and not the announcement date, is used. This means that multiple tax changes are grouped together in different years: if for example a tax increase occurs in Alabama in 2001 and another one happens in Arizona in 2003, t resemble both 2001 for the banks affected by the Alabama tax increase and 2003 for the ones affected by the Arizona increase. Because of this staggering, the regression includes time and regional fixed effects (I use the 9 regions defined by the U.S. Census) to account for any unobservable heterogeneity. Moreover, the one period lagged changes of further control variables, denoted by $\Delta X_{i,t-1}$, are included. Regression (1) includes the state unemployment rate, the state house price index as well as the financial sector state GDP growth rate as control variables. The aim is to account for both state specific industry shocks and to further reduce any heterogeneity between the treated and the control group which is not entirely eliminated via the matching procedure. All standard errors are robust to heteroscedasticity and are clustered at the state level to account for the possibility of time series correlation in the error term, which may understate the standard errors (Bertrand et al. (2004)).[13,14]

To examine whether a heterogeneity in the treatment effect exists and hence if financially better-capitalized banks react differently to a tax increase compared to

[11] Tax increases are measured by using an indicator variable. The alternative approach is to use the change in the tax rate, however a number of tax increases are introductions of surcharge taxes which do not affect the marginal tax rate but only the overall tax burden (Asker et al. (2012)). Using the changes in the tax rates instead leads to similar results.

[12] The results are quantitatively and qualitatively very similar when the change in debt is defined analogously as the difference in debt of year t and $t-1$ divided by the lagged value of total assets.

[13] Similar results are obtained if the standard errors are clustered at the bank level.

[14] To further overcome this problem, one possibility is to take a two year average of the pre-treatment variables and the post-treatment variables. The results are generally robust to this alternative regression specification.

worse-capitalized ones, I estimate a variant of Regression (1) above. The empirical specification follows Giroud & Mueller (2012) where the treatment variable is interacted with dummy variables indicating whether a financial institution is better- or worse-capitalized: WC is equal to one if the bank is financially worse-capitalized and zero otherwise, and similarly, BC determines whether a bank is better-capitalized or not and is defined analogously.[15]

$$\Delta y_{i,t} = \alpha + \beta_1 \, Treat_i \; \times \; WC_i + \beta_2 \, Treat_i \; \times \; BC_i + \beta_3 \, \Delta X_{i,t-1} + \epsilon_{i,t} \qquad (2)$$

It is in general difficult to determine precisely whether companies are financially constrained (and hence worse-capitalized) or not. While there exist different approaches and indexes for non-financial companies, such as the Kaplan & Zingales (1997) or more recently the Whited & Wu (2006) index, unfortunately there is no such index for financial institutions. In this paper, I use the median leverage ratio (separately for the treatment and control group) as a threshold to determine whether a financial institution is financially worse-capitalized (and thus financially more constrained) or not. In a given year, banks are treated as being worse-capitalized if their equity-to-assets ratio is below the median and as better-capitalized (and hence financially less constrained) if the ratio is above the median.[16] Hence, the analysis uses the fact that banks are subject to regulatory constraints and treats those banks which are closer to the boundary as worse-capitalized and the other ones as better-capitalized. To avoid that the tax increase itself affects the classification, the two years lagged pre-treatment values are examined. The splitting of the sample is evenly distributed among the different states and years, and thus I am able to analyze in how far better-capitalized banks react differently to a tax increase compared to worse-capitalized ones.

3.3 Corporate state taxes as a natural experiment

This sub-section provides a brief discussion about the general validation of using state tax changes as a natural experiment. In addition, Section 5 below depicts a large number of robustness checks and alternative regression specifications.

First, lobbying may affect tax legislation and hence the question about the validity of using tax changes as natural experiments arises (Strebulaev & Whited (2013)).

[15] An alternative regression specification is to split the sample into two groups of better- and worse-capitalized banks and perform the difference-in-differences regressions separately. Undisclosed results indicate that the results are both quantitatively and qualitatively very similar.

[16] Section 5 depicts that the main results are both qualitatively and quantitatively similar when one uses the regulatory Tier 1 capital ratio instead.

Most states, which increased their tax rates, did so for both non-financial and financial companies at the same time.[17] Hence, this suggests that banks are not lobbying for a tax increase unilaterally which seems to be a rather implausible argument in any case, as few companies have an incentive to pay higher taxes.[18] Additionally, some states increased their taxes after some exogenous event which is not related to lobbying. For example, Alabama increased its corporate income tax as a response to a Supreme Court decision in 1999 which ruled that the franchise tax for foreign corporations is unconstitutional. To cover the revenue shortfalls of this ruling, Alabama increased the financial institution tax from 6% to 6.5% on January 1^{st} 2001. While this is an extreme example, other states typically increase the taxes for a specific purpose. Hence, I regard the states tax increases as being exogenous to the individual company which thus constitute a valid natural experiment.

A second aspect worth noting is that regional or state-specific shocks may influence the analysis. In this paper, treated and control banks are active within the same broad geographical region to alleviate this concern. Moreover, Regressions (1) and (2) also include a number of control variables (the state's GDP as well as its unemployment rate and the house price inflation) to further account for state specific factors which may be affecting the bank's capital structure decisions. While I cannot include state fixed effects as they would be highly correlated with the treatment variable, this regression specification aids at diminishing the impact of unobservable state specific effects driving the results. Moreover, Section 5 shows that using a sub-sample of Sub-Chapter S banks which are active within the same state, but which are not subject to corporate taxes, as a control group, leads to quantitatively and qualitatively similar results. Hence, one can conclude that state specific effects are not the driving force behind the results.

Tax changes are not enacted in complete surprise, rather state governments and politicians discuss the new law well in advance. Hence, it is safe to assume that banks know about the tax increase prior to the final enactment. However, unfortunately, the precise determination of the timing of this knowledge is more difficult, as the announcement dates in e.g. local newspapers etc. are hard to derive. In the U.S., the majority of governments decides on the budget on a yearly basis. 6 tax increases occurred in states with an annual budget and another three happened at the beginning of a biennial budget cycle. Furthermore, midterm operating budget revisions, where states evaluate and sometimes alter their financing, are common generally. Hence, this suggests that companies know about the tax increase some months in advance.

[17] The only exception being KS in 2002 and IN in 2003 where taxes were increased for non-financial companies but not for financial institutions

[18] Endogeneity concerns, such as lobbying, are however more likely to affect tax decreases, which is the main argument why they are not part of the analysis.

Moreover, tax changes do not follow a planed schedule. Only one state increased its tax rate in two subsequent years and this happened between two biennial budget cycles (CT introduced a tax surcharge of 20% on the tax liability of banks in 2003 and increased this tax in 2004 by another 5%).

One further aspect is an ongoing discussion about how much of the state income tax companies really pay. While federal taxes are generally not deductible from the state income tax (in this sample, only AL allows this), the question whether companies engage in tax avoidance strategies exists. One example is a recent study by two think tanks (Institute on Taxation and Economic Policy and Citizens for Tax Justice) which examines 500 public companies between 2008 and 2010 and finds that a large number of companies pays fewer state income taxes than required, and a significant amount does not pay any taxes at all (McIntyre et al. (2011)). Moreover, Graham & Tucker (2006) find that the annual deductions due to shelters account to approximately 9% of the asset value of the firm. Kaye (2010) notes that while some tax avoidance strategies may be legal, illegal strategies constitute a significant amount and were estimated to be $10-15 billion in federal income tax of 2001. One popular example of a tax evasion strategy is the so-called 'Las Vegas Loophole', which refers to the situation where a company sets up an office in a state which charges no income tax and consequently transfers its profits to this state. However, over the last 10 years, both legislation and court rulings have tried to shut down tax shelters (Kaye (2010)). Furthermore, despite these tax avoidance possibilities, the analysis highlights that banks alter their capital structure in a significant way around state tax increases, indicating the importance of state taxes for financial institutions. Moreover, while in general, tax avoidance strategies cannot be prevented, one robustness check examines banks which are active in a single state only and thus do not have the possibility of shifting their profit to low income tax states. The results are stable to this alternative regression specification.

3.4 Data

This paper examines listed bank holding companies (BHC) in the U.S. between 1998 and 2011. Balance sheet data, information about the historical states of operation and the state unemployment rate is obtained by merging three different sub-databases within SNL Financial. The primary data source of the branches data is the FDIC Summary of Deposits (SOD) data, which is an annual survey of branch offices for all FDIC-insured institutions. 1998 is chosen as the starting point because this is the first year that SOD data is available in SNL Financial. The state GDP for the finance and insurance industry is retrieved via the Bureau of Economic Analysis. The state house price index is provided by the Federal Housing Finance Agency. The analysis

focuses primarily on tax changes based on net income and the data about the individual tax changes is retrieved either via the homepage of the Tax Policy Center[19], the Tax Foundation[20] or Appendix A of Heider & Ljungqvist (2013). To ensure that the tax changes are relevant for the financial institutions, they are hand-checked by examining the individual web-pages of the states revenue authorities. Furthermore, S-corporations as well as banks which have foreign deposits or foreign loans in excess of 5% of total deposits or loans are excluded, as the importance of local tax changes for foreign focused banks is likely to be low. Moreover, observations for which the annual growth rate of total assets exceeds 100% are not part of the analysis, the reason behind this is that such increases are likely to be associated with mergers or acquisitions. Last, the 10 largest banks in terms of their average assets are disregarded as well, since they can be regarded as being too big to fail and hence implicit government guarantees might influence their corporate decisions.[21] The total sample is comprised of 747 financial institutions (banks) from 46 different states (the exception being NE, NM, UT & WY where no bank has more than 75% of its branches), where some clustering of banks occurs in states such as CA, VA, NY, MI or IL.

3.5 Matching

Banks may be subject to a tax in- or decrease in a given year. In general, it is important that the treated and the control banks exhibit similar characteristics prior to a tax change since the analysis seeks to identify the causal effect of a tax increase. Therefore the nearest neighborhood matching approach (without replacement) is used to identify banks which have a similar capital structure and which are not subject to changes in their state tax. The bank characteristics are compared two years prior to the enactment of a tax increase, hence the implicit assumption is that banks do not alter their capital structure two years prior to the tax change. The advantage of using a matched sample approach, instead of using the entire sample of banks, which are not subject to a tax change in a given year, is that confounding effects are reduced.[22] In this paper, for each bank experiencing a tax increase, I match up to five financial institutions (whose tax rate does not change) according to their bank characteristics by using the supervisory rating called CAMELS (following Dursun (2012)). CAMELS describes the financial condition of the bank and stands for Capital adequacy, Asset quality, Management,

[19] http://www.taxpolicycenter.org/taxfacts/Content/PDF/state_corporate_income.pdf

[20] http://taxfoundation.org/article/state-corporate-income-tax-rates-2000-2013

[21] Including these financial institutions does not alter the results.

[22] A recent paper which advocates the usage of a matched sample approach is by Carlson et al. (2011) in which the authors examine the impact of bank capital ratios on bank lending by focusing on the geographic location of smaller financial institutions.

Earnings, Liquidity and Sensitivity to market risk. The variables are defined in the following way: C is proxied via the ratio of total equity to total assets, A via loan loss reserves as a fraction of total loans, I chose operating income over total assets for M and return on assets (net income / total assets) for E. Liquidity (L) is proxied via cash and cash equivalents divided by total assets and last, I chose the ratio of loans over deposits for the sensitivity of the market (S). Furthermore, five additional variables are chosen to ensure that the matching is more precise: I match banks according to their size (log of total assets), their amount of customer loans (net of loan loss reserves), of total non-depository liabilities, of long-term debt and of deposits, all scaled by total assets[23]. Long term debt is calculated by subtracting short term borrowings with a maturity of one year or less as well as repurchase agreements from total debt. Additionally, the U.S. is divided into four distinct regions as defined by the U.S. Census Bureau (North-East, South, Midwest, West) and only banks within the same region are chosen as potential matches. The reason behind this is that local economic conditions might have an effect on the change in the capital structure. Hence, banks which are located within the same geographical area are less likely to be affected by regional differences. While the analysis does include regional fixed effects in the regression, matching banks within a certain region enhances the overall validity of the results. Last, all state-years which experience a tax decrease are excluded as potential matches (31 tax decreases took place in 14 states).

4 Main Results

This section discusses the main results of the natural experiment and the difference-in-differences estimation. Hence, the aim is to examine both whether and when banks react to changes in their local state tax. For this purpose, three different time periods are examined separately: one year prior to a tax increase, the year of the tax increase and one year after the tax increase has occurred. Thus three difference-in-differences regressions are estimated: if a tax increase occurred in year t the dependent variable of the first regression specification is the difference between the years $t-1$ and $t-2$, the second one examines the difference between t and $t-1$ and the last one looks at the post issuance period $t+1$ vs. t. The variable t refers to the year when the new tax is levied on the financial institution and hence tax change is effective. The reason why I look at such event windows is that tax changes are rarely surprise events. Hence banks may adjust their capital structure in expectation of the tax change. On the other hand,

[23]The total amount of non-deposit liabilities is generally denoted as total debt. Hence, the analysis differentiates between deposits and other forms of unpaid principal balances, which are required to be paid by a specified date, such as long-term debt or short-term borrowings.

the benefits of a tax increase, such as the higher tax shield of leverage, only occur once the law is enacted. This would suggest that banks may wait and alter their capital structure only when the tax change actually occurred. Last, issuance costs or any other adjustment costs may delay the altering of the capital structure. This argument would speak in favor of the last time period.

The next sub-section first examines the results of the matching procedure. Consequently, Sub-Section 4.2 discusses the influence which a tax increase has on the financing of financial institutions and Sub-Section 4.3 analyzes the asset side.

4.1 Matching

The overall success of the matching procedure can be examined by analyzing the descriptive statistics of banks which experience a tax increase (two years after the matching) and of those which do not. Moreover, the design of the matching procedure allows a comparison of the treatment and the control group despite the fact that multiple tax increases occur at different points in time: for each tax increase, up to five banks are matched in the same year. Therefore, in any given year, a bank is either in the control or the treatment group and one can compare the descriptive statistics of these two groups to determine the success of the matching. Column 7 of Table 2 compares the median values across the two groups by using the Wilcoxon rank-sum test.[24] Banks, which experience a tax increase two years afterwards, are very similar to banks whose tax rate does not change. None of the variables shows a significant difference. Hence, the matching procedure is successful in determining banks which have very similar characteristics and which are at the same time located within the same geographical region.

In total, 140 banks (145 bank-years) which experience a tax increase are matched to 248 banks (300 bank-years) which are not subject to a tax change.[25] The average size of all banks is roughly $1.2 trillion - treated banks are slightly, yet not significantly, larger with $1.5 trillion vs. $1.1 trillion for the control group. Moreover, the long-term debt to total asset ratio of treated banks is 6.8% while that of non-treated banks is 7.6% (the median is 5.5% and 5.6%). The average equity to total assets ratio is 9.3% for both groups and the average amount of loans is 70% for both groups. Table 2 depicts the mean, median, minimum and maximum values for for the 11 variables which are used in the matching procedure (Panel A) and for four additional firm characteristics (Panel B) for both the treatment and the control group.[26]

[24] The advantage of the Wilcoxon rank-sum test (over the regular t-test of difference) is that the underlying data as well as the differences do not have to be normally distributed.

[25] Some banks experience either two tax increases or are used multiple times as a control bank.

[26] Moreover, the age of the banks is comparable between the two groups; treated and control banks

A further important assumption is that absent of the tax increase, treated and non-treated (control) banks exhibit the same dynamics, thus they share a common trend (Roberts & Whited (2012)). This assumption, which is called the parallel trends assumption, however, can only be tested in the pre-treatment period, hence prior to the tax increase. Therefore, I look at the growth rate of the variables used in the matching procedure two years prior to the matching. Table 3 depicts the difference of the mean growth rates and the corresponding Wilcoxon rank-sum test of difference as well as a Kolmogorov-Smirnov test of difference, which compares the entire distribution and was recently advocated by Almeida et al. (2012). All variables of both groups of banks show a common trend prior to the matching irrespective of the test of difference.

4.2 Effects on the financing side

A. Effects on leverage

This sub-section examines in how far banks, which are subject to a tax increase, alter their leverage ratio differently compared to banks which are unaffected by the tax change. Hence, the analysis first focuses on the change in the total non-depository debt ratio and consequently differentiates between long- and short-term borrowings. Table 5 depicts the main results for the difference-in-differences estimation.

Interestingly, banks adjust their non-depository leverage ratio one year prior to a tax increase, whereas there is no significant difference between treated and control banks in the subsequent years. This result indicates that banks seem to anticipate the changing tax rate and react accordingly. Hence, there exists a significant difference between banks which are affected by the tax increase and the control group of banks which are not subject to a tax change. Treated banks increase their leverage in the year prior to the tax change. This makes intuitive sense as one can highlight by the following example: Arkansas introduced a 3% surcharge tax on January 1^{st} 2003. The tax is levied on the tax liability and on top of the regular state tax which was 6.5% for the top income bracket in 2003. Thus, banks, which had at least 75% of their branches in Arkansas, and which are therefore affected by the new tax, anticipated this tax increase and decided to increase their long-term leverage in the fiscal year of 2002 in order to have the higher leverage in place, once the new tax is active. The magnitude of the increase in the total non-depository debt ratio is 0.00546, which corresponds to an increase of 5.9%, given that the average pre-tax increase level of total debt is 9.2% of total assets. Therefore, banks increase their leverage substantially. Moreover,

are on average established in the year 1990 and 1993. While the difference is statistically significant, it is economically not very large.

no significant reduction in leverage is found in the years succeeding the tax increase, indicating that banks do not reverse their decision at a later point in time.

Next, two sub-categories of non-depository debt, namely long-term and short-term debt, are examined. The parallel trends assumption holds for both variables, thus, the causal effect of a tax increase can again be determined. I find that banks increase their long-term debt rather than their short term borrowings in the year prior to the tax increase. The point estimate of the change in the long-term debt ratio is comparable to the one of the total debt ratio; the coefficient is 0.00599 which corresponds to a 8.8% increase, given the pre-tax amount of long-term leverage of 6.8% of total assets. Therefore, this finding indicates that banks increase their long-term debt by a larger fraction compared to total debt. On the contrary, short-term borrowings, which are borrowings with a maturity less than one year and are thus excluding any repurchase agreements or notes payable, are not altered upon the tax increase. One possible reason for this finding is that companies usually finance ongoing operations with short-term borrowings but they rarely manage their overall leverage ratio with it.

These findings highlight that a tax increase significantly affects the leverage decision of financial institutions. Hence, the recent descriptive argument of Admati et al. (2011) is supported; banks take the tax benefits of leverage into account when they decide upon their capital structure. Moreover, these findings are also in line with the recent results of Heider & Ljungqvist (2013) who document a 5.7% increase in the long-term leverage of non-financial companies subsequent to a tax increase.

Better- vs. worse-capitalized banks

Table 4 highlights that the treatment and the control group of financially better-capitalized and of worse-capitalized banks have again very similar bank characteristics; both exhibit similar levels and trends prior to the tax increase. Table 5 again depicts the difference-in-differences results.

Confirming Hypothesis 1, the analysis highlights that better-capitalized, unconstrained, banks are primarily the ones which increase their non-depository liabilities. The point estimate of the total debt ratio is 0.00849 and the one of the long-term debt ratio is 0.00866, both of which are statistically significant at the 5% level. On the contrary, worse-capitalized banks do not seem to be increasing their total or long-term debt; while the coefficients are positive, they are smaller and statistically not significant. Hence, this finding confirms the intuition that more constrained banks, which are banks that have a smaller fraction of capital and thus a high leverage ratio, may not have the financial flexibility to raise their debt level even further. A caveat is however that the difference between the coefficients of better- and worse-capitalized

banks is statistically not significant, indicating that banks in general have the incentive to increase their leverage once they are exposed to a tax increase. Last, Column 3 depicts that the differentiation between the two groups does not affect the results for short-term borrowings, consistent with the intuition that these are primarily used for working capital.

These findings indicate that financially better- and worse-capitalized banks react differently to a tax increase. One possible criticism may be the simplistic approach to determine whether banks are indeed worse-capitalized, and hence financially more constrained, or not. While there exist different indexes which try to define financially constrained companies (such as the Kaplan & Zingales (1997) index), there has not been much research for financial institutions. Moreover, the simple approach of using the median capital-to-asset ratio as a threshold to identify worse-capitalized banks can be justified by the finding that these banks do not increase their non-depository debt. Hence, the results may actually serve as an indirect test of validity.

B. Effects on equity, deposits and mezzanine capital

As a next step, this sub-section examines whether the increase in debt can be attributed to a significant change in other sources of financing. Thus changes in equity, customer deposits and mezzanine capital, each scaled by last period's total assets, are analyzed. It is again important to notice that all three variables show a similar common trend absent of a tax increase. Moreover, as discussed above, the matching procedure ensures that treated and non-treated banks have similar levels two years prior to a tax increase (Table 2).

The changes in the amount of total equity are discussed first: Column 1 of Table 6 depicts that there is no significant difference between treated and control firms in the year prior to the tax increase or in the year thereafter. Therefore, despite the fact that banks increase their non-depository debt one year prior to the tax increase, treated banks do not alter their overall amount of equity in this time period (the coefficient for the treatment variable is negative, but statistically not significant). Hence this finding indicates that banks do not immediately reduce their equity financing in exchange of the increased debt. However, what is interesting to notice is that one year after the tax increase, treated banks do seem to reduce their equity. The interpretation of this result is that banks may be trying to rely less on equity financing and more on debt financing in order to benefit from the enlarged tax shield.

As a second step, the question whether banks also alter their depositary financing is examined. In general, deposits play an important role for banks, the mean fraction of deposits is about 80%, and they constitute to a large fraction of the total liabilities

which a bank has. Column 3 shows no significant difference in the reaction of treated and control firms one year prior to the tax increase and in the same year of the tax increase. Therefore, consistent with the general view that deposits are sticky, banks which experience a tax increase do not alter them. In the year subsequent to the tax increase, the coefficient is however negative and significant. Therefore, at the first glimpse it seems as if banks, which experienced a tax increase, decrease their deposits compared to control firms. However, the interpretation of this result is that the level of deposits did not grow as fast for the treatment group as it did for the control group, hence the difference is negative. In general, banks which experience a tax increase may find it harder to attract new deposits as the tax rise can be regarded as a negative shock to the banks' cash flow (which in turn may affect the ability to pay higher interest rates or to promote new products). The effects the tax increase has on the asset side of banks is discussed in Sub-Section 4.3 below.

Last, the changes in the mezzanine capital are examined. Mezzanine capital is defined as the sum of minority interest, redeemable equity and all other items that appear between liabilities and equity in the balance sheet, e.g. hybrid claims such as trust-preferred securities, which can be treated as part of the regulatory Tier 1 capital but whose regular payments to investors are tax deductible. This accounts for less than 1% of total assets. Column 5 highlights that banks experiencing a tax increase do not alter their usage of mezzanine capital differently compared to other banks, which do not experience a tax increase.

Better- vs. worse-capitalized banks

The differentiation between better- and worse-capitalized banks is again helpful. The second column of Table 6 shows that less better-capitalized banks are decreasing their equity. Hence, banks which reacted to an increase in their corporate taxation by increasing their leverage, are reducing their equity financing. The point estimate is 0.0034 which corresponds to a modest decrease of 3.0% given the pre-tax increase amount of equity of 11.4% of total assets. This finding supports the idea that banks shift their financing more towards debt in order to benefit from the enlarged tax shield. Thus, parts of the proceeds from the debt issuance may be used to substitute debt for equity. In line with this finding, undisclosed results indicate that treated well-capitalized banks increase their preferred equity (but not their common equity) repurchases in the period subsequent to the tax increase.

The previous sub-section also highlighted that subsequent to a tax increase, banks alter their deposits. Column 4 of Table 6 depicts that financially worse capitalized and thus more constrained banks are primarily altering their deposits, whereas better-

capitalized banks do not change them. The point estimate is 2.7% which corresponds to a decrease of 3.4% given that the worse-capitalized banks have a deposits to asset ratio of 78.7% two years prior to the tax increase. Hence, banks which cannot increase their leverage any further are forced to alter their deposits. This finding is also in line with the below described intuition that the tax increase causes worse-capitalized banks to alter their loans decision since they are unable to offset the additional costs via an increase in their leverage. As a consequence, these financially more constrained banks may find it harder to attract new loans; non-treated banks expands their loans faster than the treated banks, causing the coefficient to be negative.

4.3 Effects on the asset side

The next question is in how far a tax increase has any effect on the asset side of financial institutions. The reasoning is that when banks are confronted with an increase in their tax rate, this can be regarded as a negative shock to their after-tax available cash flow and as a result of this, banks may decide to alter their asset side.

A. Effects on loans and branches

The question whether banks, which are subject to a tax increase, reduce their lending relative to otherwise similar control banks, is examined first. Once again, both treated and control banks have a similar level and growth rate of loans prior to the tax increase (Tables 2 & 3). Column 1 of Table 7 analyzes the same time window as above and depicts the results for the difference-in-differences analysis: banks react to the tax increase by decreasing their amount of customer loans and they do so in the same year in which a tax increase occurs.[27] The point estimate of the coefficient is 0.0159; thus given that the average expansion of the loans is 69.5% of total assets, this corresponds to a modest decrease of 2.3%.[28]

The interpretation of this finding is that the tax increase negatively affects the available cash flow of the bank and as a consequence of this, banks may have an incentive to decrease their supply of loans. An alternative interpretation is that the bank's user cost of capital is increasing due to the higher tax rate. Hence, if banks want to earn the same yield on their loans, they may charge a higher interest rate

[27] To avoid that local defaults and nonpayments influence the analysis, the results depict total loans net of loan loss reserves. However, all findings are both quantitative and qualitatively very robust to using the total amount of customer loans instead.

[28] To ensure that the effect is not driven by changes in total assets, since the dependent variable is the change in net loans scaled by the lagged value of total assets, the results are checked by using the two and three year lagged values of total assets instead. Both the point estimate and the significance level are similar to the base-line regression specification.

for their loans. This could lead to a decrease in the demand for loans, as customers have an incentive to switch to neighboring states' banks which did not experience a tax increase and hence whose loans might be cheaper, all else equal. However, it is important to notice that it is hard to differentiate perfectly between the above described supply side effect and a possible demand side effect. The reason behind this is that the tax increases occur at the same time for both financial and non-financial companies. Therefore, one explanation for the decrease in loans could be that the tax increase negatively affects the cash flow of non-financial companies. Hence, if non-financial companies reduce their investments due to the higher income taxes, they may demand fewer loans. In a recent paper, Asker et al. (2012) find that public, non-financial firms, do not alter their investment decision subsequent to tax increases, whereas private companies cut their investments by roughly 7.4% one year after a state income tax increase. Hence, this finding indicates an ambiguous role for the demand for loans. However, the distinction between financially more and less constrained banks, which is discussed below, is helpful to further differentiate the demand and supply effect.

One further question which arises is how financial institutions, which increase their leverage, spend the proceedings from the debt issuances. Thus the number of branches the banks have is examined. Column 3 highlights that banks, which experience a tax increase, seem to expand their number of branches. However, the overall size of this effect is rather small: the average bank has 20 branches and opens only half a new branch upon a tax increase. Hence, this finding also indicates that the above found leverage increase is unlikely to be the result of an overall expansion and investment plan.

Better- vs. worse-capitalized banks

The changes in the asset side are again examined separately for financially better- and worse-capitalized financial institutions, the general intuition being that the negative shock of the tax increase may influence the asset side of banks differently according to how much capital they have.

Column 2 of Table 7 highlights that only financially worse-capitalized banks reduce their loans expansion, whereas better-capitalized banks do not alter their loans decision. The coefficient of worse-capitalized banks is 0.026, whereas the one of better-capitalized is 0.007 statistically not significant. The difference between the two coefficients is significant at the 5% level (p-value of 0.029). The interpretation of this finding is that worse-capitalized banks, which do not have the financial flexibility to issue new debt and thus do not receive the benefits of an increased tax shield, are still facing the adverse shock to their after-tax cash flow. As a consequence, they are compelled to

supply fewer loans. On the contrary, better-capitalized banks, which also face a tax increase, have the financial discretion to issue new debt and thus may not need to cut their loans. This finding is useful to further discuss whether this decrease is rather a demand or a supply effect: a demand shock would affect both financially better- and worse-capitalized banks in a similar fashion. However, since only worse-capitalized banks are reducing their loans, this finding provides further evidence that banks are actively altering their loans decision subsequent to a tax increase.

Interestingly, I do not find a significant difference between better- and worse-capitalized banks when I look at the number of branches. Both coefficients are insignificant, which might be attributed to the fact that the overall effect of opening new branches subsequent to a tax increase is less pronounced.

B. Effects on the riskiness of the asset structure

Last, this sub-section examines in how far a tax increase influences the riskiness of financial institutions by comparing again treated and non-treated banks. To proxy the risk behavior of banks, three different variables are analyzed: first, the fraction of risk assets to total assets is used, similar to Delis & Kouretas (2011). Risk assets are defined as all assets which directly affect the risk taking of banks and are calculated by subtracting cash, balances due from other banks and all securities issued by U.S. government agencies from total assets. Table 2 depicts that they constitute roughly 85% of total assets. Second, the fraction of risk-weighted assets over total assets serves as a second proxy for the riskiness of the banks' assets. Third, the amount of net customer loan charge-offs is used as an alternative measure of risk.

Table 8 depicts how the three proxies for the riskiness of the asset structure change around a tax increase. All variables show a similar behavior prior to the tax increase and the parallel trend assumption holds. Hence, one can again examine the causal effect which tax changes have on the capital structure of banks. Interestingly, no significant difference in the risk taking behavior of treated and control banks is generally found. However, the distinction between financially better- and worse-capitalized banks highlights that in the year of the tax increase, financially better-capitalized, banks seem to increase their fraction of risk weighted assets over total assets, yet this effect is rather weak. Moreover, the distinction between the two groups does not play a role for the other risk proxies. Hence, this finding suggests that banks do not alter their riskiness of the asset side in a significant way once they are affected by a tax increase. One possible explanation for this finding is that banks have numerous other possibilities to alter their riskiness, such as using hybrid securities or altering their trading assets. These changes in the trading assets can in fact be performed very quickly and hence

banks do not need to wait for a tax increase to occur to be able to alter their riskiness.

5 Robustness Checks

Savings banks

In the main analysis, all corporate tax increases occur for both financial and non-financial institutions at the same time. As a result of these, non-financial companies increase their leverage as well, as was highlighted by Heider & Ljungqvist (2013). This, however, could in turn affect the leverage decision of financial institutions, as can be depicted by the following example: the non-financial company's increased demand for funds may be partially satisfied by increasing their bank borrowing. As a consequence of this, financial institutions might decide to finance such increased demand via new debt. Therefore, raising a possible endogeneity concern, the argument for the leverage increase of financial institutions may not be based on their own higher taxes but rather on a change in their investment opportunity set.

To analyze such alternative explanation, I redo the above analysis for a different sample of financial institutions, namely for savings banks. In general, savings banks, which are often called thrifts, have been supervised by the Office of Thrift Supervision[29] and focus primarily on providing consumer loans and mortgages, whereas BHCs and commercial banks traditionally emphasize their business on commercial and industrial loans. Therefore, examining savings banks has the advantage that the corporate income and franchise tax increases do not directly affect the savings banks' main customers, namely consumers. Hence, the above described endogeneity concern can be mitigated.

Table 9 depicts the difference-in-differences results for total debt, long-term debt and customer loans.[30] Similarly to the above described analysis of bank holding companies, savings banks increase their leverage one period prior to the tax increase. Therefore, this finding supports the argument that the increase in leverage is in fact due to the higher tax shield of debt. The coefficient for loans is negative, yet statistically insignificant, indicating that savings banks may not alter their loans decision subsequent to a tax change; one possible reason for such finding is the different business model of savings banks and their explicit focus on consumer loans.

Moreover, as a further robustness check, corporate income tax increases, which only affect non-financial companies, are examined. In 2002 and 2003, two states (KS and

[29] As part of the Dodd-Frank Act, the Office of Thrift Supervision merged with the Office of the Comptroller of the Currency in October 2011.

[30] Treated banks are again matched to a control group. All variables have a similar level two years prior to the tax increase and the parallel trends assumption holds.

IN) increased the corporate income tax for non-financial companies while leaving the financial institution tax unchanged. Consistent with the above findings, undisclosed results indicate that savings banks do not alter their capital structure once such a tax increase occur for non-financial institutions.

Sub-Chapter S corporations

Chapter 1 of the U.S. Internal Revenue Code defines the federal income tax. Most corporations are taxed according to the Sub-Chapter C, which implies that companies are required to pay their corporate income tax and that shareholders need to pay additional taxes on capital gains. However, small business corporations have the possibility to avoid such double taxation: they need not pay any corporate income tax. Instead, the companies' earnings are passed on to the shareholders, who then include the income on their individual tax returns. These so called S-corporations have to comply with different rules, such as having a maximum amount of shareholders, having a single class of stock, etc. While companies can elect to become a S-corporation for the federal income tax treatment, a number of U.S. states also exempts S-corporations from their state corporate income taxes (however, some states impose alternative taxes instead).[31]

In general, since 1998, financial institutions may elect to be taxed as a S corporations and according to the Subchapter S Bank Association, roughly 2,500 institutions are currently doing so. This sub-section examines whether unobservable state characteristics are likely to be driving the main results. In the above analysis, state-year fixed effects cannot be included as the corporate tax increase either affects BHCs (if they are active in a state that increases its taxes) or does not affect them (if they are active in another state). The reason for this clear-cut separation is that the vast majority of BHCs are Chapter C corporations (and others are disregarded). While the above empirical specification of using a matched sample estimation approach as well as using state specific control variables mitigates the influence of unobservable local shocks, the following analysis further depicts that the main results are unlikely to be driven by such idiosyncratic effects. I thus examine a sample of commercial banks, which are active in the same state, and use the fact that some commercial banks are Chapter C banks whereas others are Chapter S banks. Hence, in a given state, a corporate tax increase does not affect all banks similarly. Therefore, as a robustness check, 4 corporate income tax increases of states which allow the favorable treatment of Chapter S companies (AL, MD, OR, IL) are examined. Hence, Chapter C banks are the treatment group and Chapter S banks are the control group. Importantly, however, states simultaneously increased the personal taxes as well which could affect the bank's

[31] See e.g. Lewis (2008) for a state-by-state comparison.

capital structure decisions. However, personal tax increases affect the equity holders of both Chapter-C and Chapter-S banks; hence they are prevailing for both the treatment and the control group and thus, the results should be unaffected.

Table 10 highlights that, similarly to the main analysis, better-capitalized banks increase their leverage, whereas worse-capitalized banks do not.[32] Moreover, the effect on the loans decision is again negative for financially worse-capitalized banks. Hence, one can conclude that the main results are not driven by unobservable, state-specific, factors.

Normal years vs. crisis period

The above discussion examines tax increases which occurred between 2000 and 2011. Thus, the latest crisis period of 2007 - 2009 is included, which, in general, should not cause a problem because of the design of the matching procedure: banks are matched in each year separately; hence, for each bank experiencing a tax increase in e.g. 2008, I look for banks that are not experiencing a tax change in 2008 within the same broad geographical region. Therefore, both treated and control banks should be affected by the crisis in a similar way. Nevertheless, one can separate the regular, non-crisis years from the recent financial crisis period to examine whether the size and significance of the coefficients exhibit a difference. The general intuition suggests that when banks are already in economic distress and are hit by an additional adverse shock, such as a tax increase, they tend to react more strongly compared to the non-crisis period.

There are five tax increases occurring in the crisis period (MD & MI in 2008 and CT, NC & OR in 2009) and eight occurring in the non-crisis period. Therefore the above analysis is redone by looking at the two periods separately; Table 11 depicts the results for the non-crisis period in panel (a) and the crisis period in panel (b). In both periods, banks increase their non-depository debt and similarly to above, they do so in the period prior to the tax increase. Moreover, the coefficients are higher in the crisis period: the coefficient of long-term debt is 0.00310 in the non-crisis period whereas it is 0.00959 in the crisis period; the one of total debt is smaller but no longer statistically significant. This finding indicates that banks are increasing their long-term debt by a higher amount in the crisis period and hence the above intuition is supported. Interestingly, the coefficient of the change in short-term debt is not significantly different for treated and control banks for the non-crisis period, whereas in the crisis period, banks which experience a tax increase and also increase their long-term debt, reduce their short-term borrowings. Hence, banks may be substituting parts

[32] Due to the fact that MD and OR have few Sub-Chapter S banks, the empirical specification does not use a matched sample approach, but instead, includes all variables as further control variables.

of the long-term debt issuances to finance their ongoing activities and hence reduce the need for short term financing.

As a next step, the question whether banks alter their loans differently in the two periods is examined. Column 4 depicts that in both periods, banks decrease their loans upon a tax increase, however, the coefficient for the non-crisis period is no longer significant, while the one for the crisis period still is. This finding is consistent with the above explanation is that in the crisis period, banks may be financially worse-capitalized and thus more inclined to decrease the loans upon experiencing a negative shock to their after tax available cash flow.

TARP

In October 2008, the U.S. government decided to strengthen the financial institutions and initiated the Troubled Asset Relief Program (TARP) with a total size of $700 billion. One of its measures was the Capital Purchase Program, under which preferred stock and warrants were bought. The aim was to ensure and strengthen the bank's liquidity and to promote lending. Participation to the program was voluntary and a large number of banks wanted to participate due to its favorable conditions.

This sub-section analyzes whether participating banks reacted to the tax increase in a different way compared to non-participating banks. Thus, the crisis period and the years thereafter are examined separately via two additional variables: an indicator variable which is equal to one if a bank has TARP equity outstanding in a given year and zero otherwise. The second variable is an interaction term between the TARP dummy and the treatment variable. In general, between 2008 - 2011, 22.5% of the banks which are subject to a tax increase also participated in the TARP program, whereas 14.5% control banks did so. The average size of the TARP contributions are comparable between the two groups and account for 3.0% and 2.8% of total assets.

Table 12 depicts that banks, which received TARP equity, also increased their non-depository debt. Importantly, however, the interaction term between TARP equity and the tax treatment variable is insignificant, indicating that banks with government aid and which are subject to a tax increase are not behaving differently to banks which also received TARP capital but which were not subject to a tax change. Hence, one can conclude that the TARP capital did not influence the leverage decision in the period prior to the tax increase.

Examining the changes in loans, Column 3 highlights that treated banks which received TARP equity increased their loans, indicating that they may have used part of the funds to finance the expansion of new lending. On the contrary, other banks which did not receive any TARP equity partially reduced their loans. One important

aspect of the TARP analysis is however, that there may be a possible endogeneity concern since banks chose to participate in the TARP program and this choice may be dependent on the firm characteristics. Hence, this paper does not argue that the TARP program was helpful in inducing the supply of new loans an thus in mitigating the negative consequences of the liquidity dry up.

Further robustness checks

This sub-section further discusses the robustness of the results to both falsification (placebo) tests and to a large number of alternative estimation specifications.

The aim of this paper is to analyze the causal relationship between taxes and the capital structure of banks. For this purpose the focus lies on state tax changes. One possible concern may be that the results are somehow random and that tax changes are not the driving force behind the findings. As a first robustness check, the above analysis is replicated for arbitrary states which do not increase their taxes in the given year. For each state, a neighboring state is chosen to ensure that the economic conditions are comparable. Consequently, the matching procedure again searches for banks which have similar characteristics but which are not experiencing a tax change. Table 13 depicts the difference-in-differences analysis for the placebo tax increases: there is no significant differences in the leverage and loans decision between the treated and the control banks. An alternative placebo test is to analyze both the same states and the same financial companies as in the original natural experiment, however, to change the time period. Hence, I examine what happened 5 years prior to the tax change. Undisclosed results again show no significant difference between treated and control groups. Therefore, one can conclude that the natural experiment does not spuriously provide the main results.

In the above discussion, treated and control banks are matched two years prior to a tax change. One possible concern could be that the matching is too close to the enactment of the law and hence the argument might be that banks know about the law change and alter their capital structure in expectation of the new law. In this case, the regression would lead to biased results, since the matching procedure would incorrectly identify treated and non-treated banks. As a further robustness check, the matching is conducted three years prior to a tax change. Table 14 highlights that the results are robust to this alternative regression specification.

Some authors, and more prominently the popular press, stress the point that companies in general try to avoid paying taxes. One of well-known loophole is the so called 'Las Vegas Loophole', which refers to the situation where a company sets up an office in a state which charges no income tax and consequently transfers its profits to this state.

As a consequence, the company is then required to pay fewer corporate income taxes in other states. While one cannot completely exclude such behavior, I try to examine its relevance: Table 15 focuses on financial institutions, which are active in a single state only as these banks do not have the possibility to shift their income. Consistent with the above results, banks increase their long-term debt and decrease their loans as a reaction to the tax increase. As a further robustness check all banks which have less than 5% of their offices in one of the eight states that do not levy an income tax are excluded.[33] The results are again robust to this alternative regression specification.

The distinction between financially better- and worse-capitalized banks is conducted according to the bank's median equity-to-assets ratio. In order to examine the reliance of this, an alternative threshold variable is used, namely the Tier 1 regulatory capital ratio. Table 16 depicts that the main results remain both quantitatively and qualitatively similar. Moreover, undisclosed results indicate that using a 25% threshold instead of the median leads to similar results. Hence, one can conclude, that the usage of the threshold is unlikely to be driving the overall results.

The above results assume that banks are most active in states where they have at least 75% of their branches. Hence, the implicit assumption is that a tax increase affects these banks since they pay their majority of their local taxes in this state. Table 17 analyzes in how far the results depend on this assumption and depicts that the main results are still valid if a 65% or 85% threshold is chosen. While there seems to be a bit more noise in the data when choosing the 65% cutoff (the standard errors are generally higher), the results are stable to these alternative measures.

As a last robustness check, all companies, which have received TARP capital, are excluded. Table 18 highlights that the results are generally robust to this alternative regression specification, even though the coefficient for loans is marginally not significant any more. However, by focusing on companies which did not receive TARP funds, a bias is implicitly introduced into the regression, as companies applied to participate. Thus, those banks that did not participate could have either chosen not to apply (e.g. because they were well-capitalized) or were rejected. Such difficulty to clearly differentiate between these two cases let me to include all banks in the main analysis.

6 Conclusion

Using local, U.S. state, corporate tax increases as a staggered natural experiment, this paper analyzes the importance of corporate taxes for the capital structure decisions of financial institutions.

[33] NV, WA, WY, KY, MI, NE, PA and VT levy no income tax on financial institutions.

In the wake of the recent financial crisis, the capital structure as well as the taxation of financial institutions has come under increasing attention. However, despite such popular discussion, the role which corporate taxes play for banks has received very limited attention in the literature, both empirically and theoretically. One of the main empirical challenges with analyzing this relationship is that endogeneity concerns make causal statements difficult. This paper uses a natural experiment to overcome this problem: in the majority of U.S. states, financial institutions are required to pay a corporate income or franchise tax if they are active within that state. Moreover, in the past years, a number of states have increased their local tax rate. Hence, in this paper, I employ a difference-in-differences estimation approach to analyze in how far banks, whose tax rate rises, alter their both their liability side as well as their asset side of the balance sheet relative to those banks, whose tax rate does not rise.

This paper first highlights that banks increase their non-depository leverage ratio by approximately 5.9% once they are exposed to a tax increase. The main intuition behind this finding is that these banks have the ability to benefit from an enlarged tax shield of debt and can thus offset part of their larger tax expense by increasing their leverage ratio. Interestingly, this increase occurs one year prior to the final enactment of the law. Hence, banks anticipate the tax increase and expand their non-depository debt accordingly. The overall average, however, hides a large cross-sectional heterogeneity: differentiating between financially better- and worse-capitalized banks, the analysis documents that primarily better-capitalized banks enlarge their non-depository leverage. This makes intuitive sense as worse-capitalized, and hence financially more constrained, banks may not have the financial flexibility to increase their leverage even further. Moreover, better-capitalized banks also decrease their equity subsequent to a tax increase. Therefore, these findings indicate that as a reaction to a corporate tax increase, better-capitalized banks shift their capital structure towards debt financing.

Besides those financing implications, tax increases also affect the asset side of the banks' balance sheet: when banks are confronted with an increase in their corporate tax rate, this can be regarded as a reduction of their after-tax available cash flow. Therefore, as a result of such adverse shock, banks may be induced to slow down their customer loans expansion. This paper finds strong support for this argument and shows that worse-capitalized banks, which do not have the financial flexibility to increase their leverage further, are in fact restrained to expand their customer loans. On the contrary, no significant change is found for better-capitalized banks.

To summarize, this paper depicts the 1^{st} order importance of corporate taxes for financial institutions and highlights that the reaction to a tax increase critically depends on the banks' financial health.

References

Admati, A. R., DeMarzo, P. M., Hellwig, M. F., & Pfleiderer, P. C. (2011). Fallacies, irrelevant facts, and myths in the discussion of capital regulation: Why bank equity is not expensive. *Working Paper*.

Almeida, H., Campello, M., Laranjeira, B., & Weisbenner, S. (2012). Corporate debt maturity and the real effects of the 2007 credit crisis. *Critical Finance Review*, 1, 3–58.

Asker, J., Farre-Mensa, J., & Ljungvist, A. (2012). Comparing the investment behavior of public and private firms. *Working Paper*.

Barakat, M. & Rao, R. P. (2012). The role of taxes in capital structure: Evidence from taxed and non-taxed Arab economies. *Working Paper*.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics*, 119(1), 249–275.

Bertrand, M. & Mullainathan, S. (2003). Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy*, 111(5), 1043–1075.

Blum, J. M. (2008). Why 'Basel II' may need a leverage ratio restriction. *Journal of Banking & Finance*, 32(8), 1699 – 1707.

Buynak, T. M. (1987). How will tax reform affect commercial banks. *Economic Review*, (Q II), 24–34.

Carlson, M. A., Shan, H., & Warusawitharana, M. (2011). Capital ratios and bank lending: A matched bank approach. *Working Paper*.

Claessens, S., Keen, M., & Pazarbasioglu, C. (2010). *Financial Sector Taxation. The IMF's Report to the G-20 and Background Material*, chapter A Fair and Substantial Contribution by the Financial Sector, (pp. 2–73).

Cohen, D. & Cummins, J. (2006). A retrospective evaluation of the effects of temporary partial expensing. *Board of Governors of the Federal Reserve System Finance and Economics Discussion Series*, 19.

Cohen, D., Hassett, K. A., & Hubbard, R. G. (1999). *Inflation and the User Cost of Capital: Does Inflation Still Matter?* NBER Working Papers 6046.

Cullen, J. B. & Gordon, R. H. (2007). Taxes and entrepreneurial risk-taking: Theory and evidence for the U.S. *Journal of Public Economics*, 91(7-8), 1479–1505.

de Mooij, R. A. & Keen, M. (2012). Debt, taxes, and banks. *Working Paper*.

Delis, M. D. & Kouretas, G. P. (2011). Interest rates and bank risk-taking. *Journal of Banking & Finance*, 35(4), 840 – 855.

Djankov, S., Ganser, T., McLiesh, C., Ramalho, R., & Shleifer, A. (2010). The effect of corporate taxes on investment and entrepreneurship. *American Economic Journal: Macroeconomics*, 2(3), 31–64.

Dursun, H. O. (2012). The transmission of liquidity shocks to the real economy. *Working Paper*.

Ergungor, O. E., Krishnan, C., Laux, P. A., Singh, A. K., & Zebedee, A. A. (2010). Examining bank SEOs: Are offers made by undercapitalized banks different? *Journal of Financial Intermediation*, 19(2), 207 – 234.

Flannery, M. J. & Rangan, K. P. (2008). What caused the bank capital build-up of the 1990s? *Review of Finance*, 12, 391–429.

Giroud, X. & Mueller, H. M. (2010). Does corporate governance matter in competitive industries? *Journal of Financial Economics*, 95(3), 312–331.

Giroud, X. & Mueller, H. M. (2012). Capital and labor reallocation inside firms. *Working Paper*.

Graham, J. R. (2006). A review of taxes and corporate finance. *Foundations and Trends in Finance*, 2, 573–691.

Graham, J. R. & Tucker, A. L. (2006). Tax shelters and corporate debt policy. *Journal of Financial Economics*, 81(3), 563 – 594.

Gropp, R. & Heider, F. (2010). The determinants of bank capital structure. *Review of Finance*, 14(4), 587–622.

Hanlon, M. & Heitzman, S. (2010). A revview of tax research. *Journal of Accounting and Economics*, 50, 127–178.

Hassett, K. A. & Hubbard, R. G. (2002). Tax policy and business investment. In A. J. Auerbach & M. Feldstein (Eds.), *Handbook of Public Economics*, volume 3 of *Handbook of Public Economics* chapter 20, (pp. 1293–1343). Elsevier.

Heider, F. & Ljungqvist, A. (2013). As certain as debt and taxes: Estimating the tax sensitivity of leverage from exogenous state tax changes. *Working Paper*.

Hemmelgarn, T. & Teichmann, D. (2013). Tax reforms and the capital structure of banks. *Working Paper*.

Kaplan, S. N. & Zingales, L. (1997). Do investment-cash flow sensitivities provide useful measures of financing constraints? *The Quarterly Journal of Economics*, 112(1), 169–215.

Kaye, T. A. (2010). The regulation of corporate tax shelters in the United States. *American Journal of Comparative Law*, 58(1), 585–604.

Kuprianov, A. (1997). Tax disincentives to commercial bank lending. *Federal Reserve Bank of Richmond Economic Quarterly*, 83(2), 67–97.

Lewis, R. (2008). A state-by state analysis of S corporation tax treatment.

McIntyre, R. S., Gardner, M., Wilkins, R. J., & Phillips, R. (2011). Corporate taxpayers & corporate tax dodgers, 2008-10. *Working Paper*.

Neubig, T. S. & Sullivan, M. A. (1987). The effect of the tax reform act of 1986 on commercial banks. *Compendium of Tax Research 1987*.

Panier, F., Pérez-González, F., & Villanueva, P. (2012). Capital structure and taxes: What happens when you (also) subsidize equity? *Working Paper*.

Roberts, M. R. & Whited, T. M. (2012). Endogeneity in empirical corporate finance. In G. Constantinides, M. Harris, & R. Stulz (Eds.), *Handbook of the Economics of Finance*, volume 2. Elsevier.

Serether, J. M., Eberle, M. P., & Colavito, M. L. (2011). Can you take this to the bank? State taxation of financial institutions. *Tax Analyst*, 1, 717 – 724.

Strebulaev, I. A. & Whited, T. M. (2013). Dynamic corporate finance is useful: A comment on Welch. *Critical Finance Review*, 2, 173–191.

Whited, T. M. & Wu, G. (2006). Financial constraints risk. *Review of Financial Studies*, 19(2), 531–559.

Wu, L. & Yue, H. (2009). Corporate tax, capital structure, and the accessibility of bank loans: Evidence from China. *Journal of Banking & Finance*, 33(1), 30 – 38.

Appendix: Tables

Table 1: Summary statistics: corporate state tax increases
This table depicts the corporate state tax increases for financial institutions between 2000-2011. The data is retrieved from the homepage of the Tax Policy Center (http://www.taxpolicycenter.org/taxfacts/Content/PDF/state_corporate_income.pdf) and of the Tax Foundation (http://taxfoundation.org/article/state-corporate-income-tax-rates-2000-2013) and additionally via Appendix A of Heider & Ljungqvist (2013). Column 6 denotes the total number of banks which are affected by a tax increase.

State	Year of enactment	Type of tax change	Tax rate before	Tax rate after	# of banks affected
AL	2001	Income tax increase	6.0%	6.5%	11
NH	2001	Income tax increase	8.0%	8.5%	2
TN	2002	Income tax increase	6.0%	6.5%	10
MD	2008	Income tax increase	7.0%	8.25%	20
OR	2009	Income tax increase	6.6%	7.9%	11
IL	2011	Income tax increase	4.8%	7.0%	25
AR	2003	Introduction of surcharge tax		3.0%	4
CT	2003	Introduction of surcharge tax		20.0%	5
CT	2004	Increase of surcharge tax	20.0%	25.0%	5
NJ	2006	Introduction of surcharge tax		4.0%	19
MI	2008	Introduction of tax on net capital		0.235%	30
CT	2009	Introduction of surcharge tax		10.0%	7
NC	2009	Introduction of surcharge tax		3.0%	25

Table 2: Summary statistics: treated and control banks

This table depicts the summary statistics for the eleven variables which are used in the matching procedure (Panel A) and for short-term borrowings, mezzanine debt, risk assets and risk-weighted assets (Panel B). Risk assets are calculated by subtracting cash, balances due from other banks and all securities issued by U.S. government agencies from total assets. The treated group refers to banks which experience a tax increase two years later, and the control group depicts the matched banks whose tax rate does not change. The variable Size is the natural logarithm of total assets and Loans denotes total customer loans net of loan loss reserves. The Wilcoxon-test analyzes the difference in medians between the control and treatment group and the column on the far right depicts its p-values.

		Mean	Median	Min	Max	Wilcoxon
Panel A						
Equity / Assets %	Treated	9.36	8.76	4.25	24.91	0.55
	Control	9.32	8.94	2.24	27.39	
Loan-loss reserves / Loans %	Treated	1.34	1.18	0.08	4.62	0.98
	Control	1.34	1.19	0.52	5.64	
Operating income / Assets %	Treated	4.41	4.29	2.00	8.28	0.49
	Control	4.49	4.40	1.96	15.49	
Net income / Assets %	Treated	0.57	0.75	−8.47	2.02	0.20
	Control	0.67	0.86	−5.82	1.99	
Cash / Assets %	Treated	5.90	4.30	1.00	31.37	0.82
	Control	5.80	4.38	0.77	30.27	
Loans / Deposits %	Treated	87.27	87.53	38.18	132.80	0.49
	Control	88.25	88.55	44.55	161.10	
Size	Treated	13.18	12.84	11.29	16.74	0.87
	Control	13.11	13.03	10.77	16.17	
Deposits / Assets %	Treated	80.22	81.43	55.53	91.16	0.42
	Control	79.53	80.40	50.66	96.31	
Total debt / Assets %	Treated	9.18	8.23	0.00	33.08	0.20
	Control	10.18	9.29	0.00	40.38	
Long-term debt / Assets %	Treated	6.81	5.54	0.00	22.41	0.56
	Control	7.64	5.64	0.00	40.29	
Loans / Assets %	Treated	69.51	69.91	34.80	93.74	0.84
	Control	69.73	71.20	30.52	90.34	
Panel B						
Short-term borrowings / Assets %	Treated	0.71	0.00	0.00	11.43	0.35
	Control	0.57	0.00	0.00	10.34	
Mezzanine debt / Assets %	Treated	0.08	0.00	0.00	3.02	0.10
	Treated	0.04	0.00	0.00	2.89	
Risk assets / Assets %	Treated	85.41	87.08	59.25	99.58	0.23
	Control	84.30	85.79	58.31	98.45	
Risk-weighted assets / Assets %	Treated	73.92	74.03	29.24	97.18	0.29
	Control	73.19	73.96	42.26	99.63	

Table 3: Parallel trend assumption

This table compares the growth rates of the different bank characteristics between the treatment group and the control group. The growth rate is calculated in the period from two years prior to the matching until the time of the matching. Column 3 depicts the median growth rate while Column 4 shows the difference of the median values of the respective distribution. Column 5 depicts the p-values of the Kolmogorov-Smirnov (K-S) test of differences and Column 6 shows the p-values of the Wilcoxon rank-sum test analyzing the differences in medians.

Growth rate of		Median	Difference	K-S test	Wilcoxon test
Equity / Assets %	Treated	1.13	1.43	0.14	0.12
	Control	−0.29			
Loan-loss reserves / Loans %	Treated	0.50	1.51	0.26	0.58
	Control	−1.51			
Operating income / Assets %	Treated	1.41	1.66	0.13	0.24
	Control	−0.25			
Net income / Assets %	Treated	−9.68	0.16	0.72	0.82
	Control	−9.84			
Cash / Assets %	Treated	−2.82	−6.51	0.47	0.16
	Control	−9.33			
Loans / Deposits %	Treated	2.32	0.03	0.95	0.86
	Control	2.29			
Size %	Treated	1.11	0.03	0.33	0.82
	Control	1.08			
Deposits / Assets %	Treated	−0.17	−0.94	0.92	0.64
	Control	−0.23			
Total debt / Assets %	Treated	−5.00	−2.75	0.48	0.37
	Control	−2.25			
Long-term debt / Assets %	Treated	−4.31	−1.26	0.82	0.59
	Control	−3.05			
Loans / Assets %	Treated	1.12	−1.14	0.50	0.77
	Control	2.26			

Table 4: Summary statistics: under- vs. well-capitalized banks

This table depicts the summary statistics for the main variables of interest separately for better- and for worse-capitalized banks. Banks, which are worse-capitalized, have an equity-to-assets ratio which is below the median two years prior to the tax increase, whereas the one of better-capitalized banks is above the median. The treated group refers to banks which experience a tax increase two years later, and the control group depicts the matched banks whose tax rate does not change. The variable Size is the natural logarithm of total assets and Loans denotes total customer loans net of loan loss reserves.

			Mean	Median	Min	Max
Equity / Assets %	Worse-capitalized	Treated	7.32	7.47	4.25	8.71
		Control	7.55	7.86	2.24	8.93
	Better-capitalized	Treated	11.41	10.70	8.77	24.91
		Control	11.10	10.46	8.94	27.39
Loan loss reserves / Loans %	Worse-capitalized	Treated	1.38	1.16	0.52	4.62
		Control	1.34	1.16	0.56	5.64
	Better-capitalized	Treated	1.29	1.20	0.08	2.71
		Control	1.34	1.22	0.52	3.73
Operating income / Assets %	Worse-capitalized	Treated	4.24	4.04	2.00	8.28
		Control	4.37	4.26	1.96	15.49
	Better-capitalized	Treated	4.54	4.57	2.24	7.19
		Control	4.62	4.56	2.58	8.99
Net income / Assets %	Worse-capitalized	Treated	0.33	0.66	−8.47	2.02
		Control	0.55	0.82	−4.37	1.95
	Better-capitalized	Treated	0.80	0.80	−1.26	2.00
		Control	0.79	0.88	−5.82	1.99
Cash / Assets %	Worse-capitalized	Treated	4.90	3.71	1.00	31.37
		Control	5.50	3.99	1.03	30.27
	Better-capitalized	Treated	6.89	5.12	1.48	25.54
		Control	6.11	4.97	0.77	30.07
Loans / Deposits %	Worse-capitalized	Treated	88.75	88.70	38.18	122.85
		Control	90.01	91.19	53.43	161.10
	Better-capitalized	Treated	85.59	83.41	47.47	132.81
		Control	86.50	86.99	44.55	131.63
Size	Worse-capitalized	Treated	13.30	12.94	11.38	16.74
		Control	13.22	13.13	10.77	15.94
	Better-capitalized	Treated	13.07	12.78	11.29	16.66
		Control	13.00	12.76	10.94	16.17
Total debt / Assets %	Worse-capitalized	Treated	11.32	9.96	0.00	33.08
		Control	12.01	11.74	0.00	40.38
	Better-capitalized	Treated	7.02	5.74	0.00	24.46
		Control	8.35	7.27	0.00	30.79
Long-term debt / Assets %	Worse-capitalized	Treated	8.66	7.88	0.00	22.41
		Control	9.35	8.04	0.00	40.29
	Better-capitalized	Treated	5.02	4.41	0.00	19.78
		Control	5.93	3.97	0.00	30.44
Loans / Assets %	Worse-capitalized	Treated	70.23	70.96	34.80	89.25
		Control	71.05	72.87	36.77	90.34
	Better-capitalized	Treated	68.64	69.62	41.46	93.74
		Control	68.42	69.52	30.52	89.87
Deposits / Assets %	Worse-capitalized	Treated	79.73	80.90	55.53	91.16
		Control	79.42	79.91	50.66	96.31
	Better-capitalized	Treated	80.73	81.76	64.05	89.85
		Control	79.64	80.44	52.96	89.98

Table 5: Leverage effects of a tax increase

This table depicts the results for the difference-in-differences analysis where the dependent variable is either the change in the total, long-term or short-term non-depository debt ratio. Three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the bank's reaction occurring in the year of the tax increase. The dependent variable is an indicator variable indicating whether a bank is subject to a tax increase or not. Financially worse-capitalized (WC) and better-capitalized (BC) banks have an equity-to-assets ratio below (above) the median. To control for possible heterogeneity between treated and control banks, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Total debt		Long-term debt		Short-term debt	
$Tax\ increase_{t+1}$	0.546^{**}		0.599^{***}		-0.138	
	(2.70)		(3.14)		(-0.99)	
$Tax\ increase_{t+1} \times WC$		0.259		0.341		-0.341
		(0.85)		(1.07)		(-0.72)
$Tax\ increase_{t+1} \times BC$		0.849^{**}		0.866^{**}		-0.133
		(2.60)		(2.50)		(-0.89)
$Tax\ increase_t$	-0.010		0.039		0.055	
	(-0.36)		(-0.11)		(0.28)	
$Tax\ increase_t \times WC$		-0.167		-0.058		0.118
		(-0.55)		(-0.25)		(0.44)
$Tax\ increase_t \times BC$		0.118		0.081		-0.009
		(0.30)		(0.26)		(-0.06)
$Tax\ increase_{t-1}$	0.193		0.344		0.006	
	(0.63)		(1.25)		(-0.06)	
$Tax\ increase_{t-1} \times WC$		0.333		0.445		0.023
		(0.81)		(1.16)		(0.13)
$Tax\ increase_{t-1} \times BC$		-0.090		0.001		-0.038
		(-0.28)		(0.40)		(-0.20)

Table 6: Effects of a tax increase on equity, deposits and mezzanine capital

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in equity, deposits or in mezzanine debt. For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The dependent variable is an indicator variable indicating whether a bank is subject to a tax increase or not. Financially worse-capitalized (WC) and better-capitalized (BC) banks have an equity-to-assets ratio below (above) the median. To control for possible heterogeneity between treated and control banks, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Equity		Deposits		Mezzanine debt	
$Tax\ increase_{t+1}$	−0.182		−0.403		−0.025	
	(−1.60)		(−0.43)		(−1.47)	
$Tax\ increase_{t+1} \times WC$		−0.023		1.110		−0.031
		(−0.09)		(0.82)		(−1.45)
$Tax\ increase_{t+1} \times BC$		−0.281*		−1.186		−0.014
		(−1.89)		(−1.28)		(−0.98)
$Tax\ increase_t$	−0.090		−1.100		0.008	
	(−0.69)		(−1.35)		(0.26)	
$Tax\ increase_t \times WC$		0.0122		−1.503		0.003
		(0.07)		(−1.66)		(0.08)
$Tax\ increase_t \times BC$		−0.123		−0.706		−0.012
		(−0.74)		(−0.79)		(−0.37)
$Tax\ increase_{t-1}$	−0.298**		−1.182**		−0.015	
	(−2.38)		(−2.02)		(−0.44)	
$Tax\ increase_{t-1} \times WC$		−0.253		−2.691**		−0.019
		(−1.17)		(−2.60)		(−0.70)
$Tax\ increase_{t-1} \times BC$		−0.342***		−0.306		−0.008
		(−2.75)		(−0.36)		(−0.21)

Table 7: Effects of a tax increase on loans and branches

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in net loans or the change in the number of branches. For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The dependent variable is an indicator variable indicating whether a bank is subject to a tax increase or not. Financially worse-capitalized (WC) and better-capitalized (BC) banks have an equity-to-assets ratio below (above) the median. To control for possible heterogeneity between treated and control banks, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. The changes in net loans are reported in percentage points.

	Loans		Branches	
$Tax\ increase_{t+1}$	−0.238		0.233	
	(−0.28)		(1.25)	
$Tax\ increase_{t+1} \times WC$		0.592		0.200
		(0.61)		(0.47)
$Tax\ increase_{t+1} \times BC$		−0.695		0.429
		(−0.65)		(1.36)
$Tax\ increase_t$	−1.592**		0.514**	
	(−2.19)		(2.09)	
$Tax\ increase_t \times WC$		−2.624**		0.722
		(−2.58)		(1.65)
$Tax\ increase_t \times BC$		−0.710		0.351
		(−1.06)		(1.32)
$Tax\ increase_{t-1}$	−0.606		0.230	
	(−0.58)		(0.77)	
$Tax\ increase_{t-1} \times WC$		−0.317		0.435
		(−0.24)		(0.92)
$Tax\ increase_{t-1} \times BC$		−0.532		0.082
		(−0.59)		(0.26)

Table 8: Effects of a tax increase on the riskiness of the asset structure

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in the fraction of risk assets over total assets, the change in the fraction of risk-weighted assets divided by total assets and the change in customer loans charge-offs. For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The dependent variable is an indicator variable indicating whether a bank is subject to a tax increase or not. Financially worse-capitalized (WC) and better-capitalized (BC) banks have an equity-to-assets ratio below (above) the median. To control for possible heterogeneity between treated and control banks, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Risk assets		Risk-weighted assets		Customer loan charge-offs	
$Tax\ increase_{t+1}$	0.142		0.010		0.057	
	(0.38)		(0.04)		(1.88)	
$Tax\ increase_{t+1} \times WC$		−0.233		−0.628		0.105
		(−0.44)		(−1.29)		(0.78)
$Tax\ increase_{t+1} \times BC$		0.465		0.695		−0.015
		(1.07)		(1.15)		(0.13)
$Tax\ increase_t$	−0.052		0.257		0.057	
	(0.14)		(0.73)		(0.43)	
$Tax\ increase_t \times WC$		−0.216		−0.558		−0.001
		(−0.34)		(−1.05)		(−0.84)
$Tax\ increase_t \times BC$		0.263		1.073*		−0.000
		(0.85)		(1.91)		(−0.00)
$Tax\ increase_{t-1}$	−0.200		0.429		0.062	
	(−0.44)		(0.83)		(0.31)	
$Tax\ increase_{t-1} \times WC$		0.344		0.729		−0.164
		(0.59)		(1.55)		(0.65)
$Tax\ increase_{t-1} \times BC$		−0.631		0.166		0.094
		(−1.18)		(0.22)		(0.49)

Table 9: Robustness check: savings banks

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in the total or the long-term debt ratio (columns 1 & 2) and in net loans (column 3). Three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. Moreover, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Total debt	Long-term debt	Loans
$Tax\ increase_{t+1}$	0.524^{**}	0.382^{**}	0.020
	(2.69)	(2.10)	(0.03)
$Tax\ increase_t$	-0.238	-0.241	-0.185
	(-0.82)	(-0.89)	(-0.41)
$Tax\ increase_{t-1}$	0.245	0.260	0.335
	(1.15)	(1.07)	(0.62)

Table 10: Robustness check: Sub-Chapter S commercial banks

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in the total or the long-term debt ratio (columns 1 & 2) and in net loans (column 3). The treatment group are all Sub-Chapter C commercial banks which are active in AL, MD, OR and IL and the control group are Sub-Chapter S commercial banks within the same states. Further control variables include the lagged changes in the following variables: C, A, M, E, L, S, loans, deposits, size, the states' unemployment rate, GDP growth rate and the house price inflation. All regressions include year fixed effects. Three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The dependent variable is an indicator variable indicating whether a bank is subject to a tax increase or not. Financially worse-capitalized (WC) and better-capitalized (BC) banks have an equity-to-assets ratio below (above) the median. All changes are reported in percentage points.

	Total debt	Long-term debt	Loans
$Tax\ increase_{t+1} \times WC$	-0.291	0.052	-0.283
	(-1.08)	(-0.23)	(-0.42)
$Tax\ increase_{t+1} \times BC$	0.571^{**}	0.623^{**}	0.459
	(2.09)	(2.63)	(0.68)
$Tax\ increase_t \times WC$	-0.174	0.023	-1.340^{*}
	(-0.77)	(0.11)	(-1.68)
$Tax\ increase_t \times BC$	0.253	0.274	-0.287
	(1.04)	(1.41)	(-0.36)
$Tax\ increase_{t-1} \times WC$	-0.358	-0.236	-0.124
	(-1.58)	(-1.23)	(-0.16)
$Tax\ increase_{t-1} \times BC$	-0.321	-0.071	0.579
	(-1.33)	(-0.37)	(0.76)

Table 11: Robustness check: non-crisis vs. crisis period

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in the total, the long-term or short-term debt ratio (columns 1, 2 & 3) and in net loans (column 4). Panel a) depicts the non-crisis period whereas panel b) examines the crisis period. Three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. Moreover, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

a)	Non-crisis period			
	Total debt	Long-term debt	Short-term debt	Loans
$Tax\ increase_{t+1}$	0.437**	0.310	0.165	0.123
	(2.22)	(1.11)	(0.87)	(−0.08)
$Tax\ increase_t$	−0.309	0.119	0.046	−2.091
	(−0.93)	(0.41)	(0.13)	(−1.28)
$Tax\ increase_{t-1}$	0.331	0.437	0.037	−0.240
	(0.54)	(0.77)	(0.13)	(−0.11)
b)	Crisis period: 2008 & 2009			
	Total debt	Long-term debt	Short-term debt	Loans
$Tax\ increase_{t+1}$	0.332	0.959**	−0.491**	0.871
	(0.69)	(2.14)	(−2.38)	(0.36)
$Tax\ increase_t$	−0.130	−0.296	−0.067	−1.832*
	(−0.31)	(−0.69)	(−0.46)	(−1.96)
$Tax\ increase_{t-1}$	−0.160	0.305	−0.084	−1.470
	(−0.43)	(−1.10)	(−0.70)	(−1.23)

Table 12: Robustness check: banks which received TARP capital

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in the total or the long-term debt ratio (columns 1 & 2) and in net loans (column 3). For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. In a similar fashion, $TARP\ equity_t$ refers to an indicator variable which is equal to one if a company has TARP equity outstanding in a given year and zero otherwise. $Tax\ increase_t$ x $TARP\ equity_t$ is an interaction variable between the two before mentioned variables. Variables whose growth rate is significantly different between treated and control group after the matching, are included in the regressions. Moreover, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Total debt	Long-term debt	Loans
$Tax\ increase_{t+1}$	0.619*	0.741**	−0.011
	(1.89)	(2.50)	(0.01)
$TARP\ equity_{t+1}$	0.939*	1.001*	0.482
	(1.83)	(1.95)	(0.20)
$Tax\ increase_{t+1}$ x $TARP\ equity_{t+1}$	0.145	−0.256	2.50
	(0.16)	(−0.28)	(0.70)
$Tax\ increase_t$	0.656	0.549*	−1.160
	(1.59)	(1.70)	(−1.02)
$TARP\ equity_t$	−0.555	0.287	0.488
	(−1.06)	(0.85)	(0.26)
$Tax\ increase_t$ x $TARP\ equity_t$	−1.540	−1.241	1.258
	(−1.33)	(−1.13)	(0.32)
$Tax\ increase_{t-1}$	−0.278	−0.199	−2.190
	(−0.65)	(−0.65)	(−1.64)
$TARP\ equity_{t-1}$	−0.246	−0.326	−1.281
	(−0.44)	(−0.64)	(−0.68)
$Tax\ increase_{t-1}$ x $TARP\ equity_{t-1}$	0.579	0.891	6.120***
	(0.52)	(1.18)	(2.85)

Table 13: Robustness check: neighboring states which do not experience a tax increase

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in long-term debt (column 1), the change in total debt (column 2) or the change in customer loans (column 3). For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs in a neighboring state one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred in a neighboring state one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase of the neighboring state. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. Moreover, the lagged changes in the states unemployment and GDP growth rate are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Long-term debt	Total debt	Loans
$Tax\ increase_{t+1}$	−0.471	−0.232	0.530
	(−1.26)	(−0.67)	(0.65)
$Tax\ increase_t$	0.144	−0.002	−0.294
	(0.55)	(−0.01)	(−0.36)
$Tax\ increase_{t-1}$	−0.184	−0.257	−0.690
	(0.82)	(−0.78)	(−0.55)

Table 14: Robustness check: match 3 years prior to a tax increase

This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in long-term debt (column 1), the change in total debt (column 2) or the change in total loans (column 3). For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The matching is performed 3 years prior to the tax increase. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects.All changes are reported in percentage points.

	Long-term debt	Total debt	Loans
$Tax\ increase_{t+1}$	0.974***	0.979***	0.035
	(3.61)	(3.02)	(0.05)
$Tax\ increase_t$	0.150	−0.044	−1.831**
	(0.60)	(−0.15)	(−2.23)
$Tax\ increase_{t-1}$	0.549	0.301	−0.014
	(1.50)	(0.78)	(−0.02)

Table 15: Robustness check: banks that are active in a single state only
This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in long-term debt (column 1), the change in total debt (column 2) or the change in total loans (column 3). For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. To control for possible heterogeneity between treated and control banks, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Long-term debt	Total debt	Loans
$Tax\ increase_{t+1}$	0.514^{*}	0.138	-1.362^{*}
	(1.90)	(0.37)	(-1.93)
$Tax\ increase_t$	-0.440	-0.410	-1.550^{*}
	(-1.09)	(-1.00)	(-1.88)
$Tax\ increase_{t-1}$	0.244	0.139	-0.719
	(0.57)	(0.30)	(-0.73)

Table 16: Robustness check: worse- and better-capitalized banks based on the Tier 1 ratio as a threshold
This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in the total or the long-term debt ratio (columns 1 & 2) and in net loans (column 3). Three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. The dependent variable is an indicator variable indicating whether a bank is subject to a tax increase or not. Financially worse-capitalized (WC) and better-capitalized (BC) banks have a Tier 1 ratio below (above) the median. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. To control for possible heterogeneity between treated and control banks, the lagged changes in the states' unemployment, the GDP growth rate and the house price inflation are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Total debt	Long-term debt	Loans
$Tax\ increase_{t+1} \times WC$	0.180	0.221	0.158
	(0.51)	(0.61)	(0.16)
$Tax\ increase_{t+1} \times BC$	0.876^{**}	0.790^{**}	0.186
	(2.42)	(2.37)	(0.15)
$Tax\ increase_t \times WC$	-0.062	0.143	-2.060^{*}
	(-0.12)	(0.48)	(-1.81)
$Tax\ increase_t \times BC$	0.220	-0.143	-0.564
	(0.59)	(0.41)	(-0.60)
$Tax\ increase_{t-1} \times WC$	0.306	0.652	-0.014
	(0.61)	(1.36)	(-0.01)
$Tax\ increase_{t-1} \times BC$	0.414	0.319	-0.483
	(1.29)	(0.85)	(-0.51)

Table 17: Robustness check: different thresholds to determine the nexus
This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in long-term debt (column 1), the change in total debt (column 2), or the change in total loans (column 3). Two different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later (columns 1 & 2) and $Tax\ increase_t$ depicts the results for the same year as the tax increase (column 3). The first (second) line depicts the results when the state is chosen according the number of branches to be bigger than 65% (85%). The standard errors are robust to heteroscedasticity and clustered at the state level. Moreover, the lagged changes in the states unemployment and GDP growth rate are included as further control variables. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	$Tax\ increase_{t+1}$		$Tax\ increase_t$
	Long-term debt	Total debt	Loans
65%	0.667***	0.504**	-1.732**
	(3.36)	(2.24)	(-2.17)
85%	1.162***	0.983***	-1.743**
	(4.19)	(2.80)	(-2.13)

Table 18: Robustness check: exclude banks having received TARP
This table depicts the results for the difference-in-differences analysis where the dependent variable is the change in long-term debt (column 1), the change in total debt (column 2) or the change in net customer loans (column 3). For each dependent variable, three different time periods are analyzed: $Tax\ increase_{t+1}$ resembles the situation where a tax increase occurs one year later. $Tax\ increase_{t-1}$ means that a tax increase occurred one year before. $Tax\ increase_t$ depicts the results for the same year as the tax increase. Banks which received TARP capital are disregarded. The bank characteristics whose growth rate is significantly different between treated and control group after the matching are included in the regressions. Moreover, the lagged changes in the states unemployment and GDP growth rate are included as further control variables. The standard errors are robust to heteroscedasticity and clustered at the state level. All regressions include year and regional fixed effects. All changes are reported in percentage points.

	Long-term debt	Total debt	Loans
$Tax\ increase_{t+1}$	0.771***	0.638**	−0.404
	(3.64)	(2.43)	(−0.47)
$Tax\ increase_t$	−0.118	−0.209	−1.230
	(−0.34)	(−0.56)	(−1.44)
$Tax\ increase_{t-1}$	0.198	−0.011	−0.769
	(0.56)	(−0.03)	(−0.83)