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## How do financial institutions react to a tax increase?☆

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### ABSTRACT

This paper empirically highlights the role and significance of taxes for the capital structure decisions of banks. Using a difference-in-differences methodology, I show that an increase in the local U.S. state corporate tax rate affects the banks' financing as well as their operating choices. Better-capitalized banks raise their long-term non-depository debt and thus benefit from an enlarged tax shield. Worse-capitalized banks instead reduce their lending because a higher tax rate increases the tax-adjusted cost of funding, which renders the marginal loan unprofitable.

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### 1. Introduction

It is well known that corporate taxes play an integral part in virtually all capital structure models and that the tax benefit of debt is generally thought to be of critical importance for determining differences in capital structure decisions of non-financial companies (for instance, [Hanlon and Heitzman, 2010](#) and [Graham and Leary, 2011](#) provide recent reviews). For banks, however, the picture looks different: Both the theoretical and empirical literature focuses primarily on bank-specific factors of the capital structure. Aspects such as direct and indirect government guarantees (e.g., deposit insurance or too-big-to-fail arguments) or the role of equity capital for the survival and performance of banks

have traditionally been the focus of attention (e.g., [Acharya and Kulkarni, 2014](#); [Berger and Bouwman, 2013](#); [Admati et al., 2013](#)). As a consequence, the question of whether corporate taxes are an important determinant of the capital structure decisions of banks remains largely unanswered.

Nevertheless, qualifying and quantifying the significance of tax distortions for banks is interesting and economically relevant because it has implications that go beyond the banks' individual financial decisions: It facilitates both regulators' and politicians' understanding of the (unintended) consequences of a tax increase and may thus ultimately benefit our understanding of the interaction of financial institutions and the rest of the economy.

I make two important contributions in this paper: First, my analysis highlights that banks alter both their financing and their operating (lending) decisions once they are exposed to a corporate tax increase. Second, I emphasize the profound influence that a bank's existing financial situation has on its capital structure adjustments. Better-capitalized banks raise their non-depository leverage ratio and hence use their financial flexibility to benefit from an enlarged tax shield of debt.<sup>1</sup> Worse-capitalized banks reduce their loans since a tax increase can be regarded as a negative shock to their tax-adjusted cost of funding that renders the marginal loan unprofitable. Altogether, these findings are consistent with profit-maximizing actions by banks and the general role

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<sup>1</sup> Banks are regarded as being better-capitalized if they have an equity-to-assets ratio above the median. The remaining banks are regarded as being worse-capitalized or financially more constrained.

and importance of taxes for the financial sector is thus emphasized.

One challenge in the empirical analysis of whether taxes affect banks' policies is that the marginal tax rates are endogenous. In order to circumvent this, I use local U.S. state tax increases as a quasi-natural experiment. In general, various state law changes have been a popular instrument to examine several capital structure decisions (e.g., [Bertrand and Mullainathan, 2003](#); [Giroud and Mueller, 2010](#)). More recently, [Heider and Ljungqvist \(2015\)](#) were the first to analyze the effect of state corporate tax increases and decreases on the leverage decision of non-financial companies. Adjusting their set-up for banks, I employ a difference-in-differences estimation approach where I compare banks that are affected by a tax increase to those that are *not* affected.

I examine U.S. bank holding companies that were subject to 13 distinct state tax increases between 2000 and 2011. First one needs to determine where those banks generate their profits and thus in which state they pay their local income taxes. This is typically troublesome since regional balance sheets are not publicly available. Using a novel approach, I approximate the spatial distribution of banks via the geographic location of their branches. The second challenge is to identify an appropriate comparison group. One needs to ensure that all institutions have similar characteristics in absence of the law change. Therefore, treated banks (which were exposed to a tax increase) are matched to control banks (which were *not* exposed to a tax increase) on a large number of dimensions two years prior to a tax change. Moreover, both groups of banks are required to be active in the same broad geographic region to reduce the impact of unobservable local economic conditions.

My analysis yields several distinct sets of findings: First, examining the relationship between taxes and the financing decision of banks, I find that treated banks significantly increase their non-depository leverage ratio by 6.4% (or alternatively by \$12 million given the mean amount of the total non-depository debt of \$184 million). The main intuition behind this finding is that banks have the ability to benefit from an enlarged tax shield, which prevails due to the higher 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: Not all treated banks react in a similar fashion; the effect depends on how well capitalized banks are. It is primarily better-capitalized banks that have the financial flexibility to increase their non-depository debt whereas financially worse-capitalized banks do not increase their total debt. Instead, what the latter banks do is to partially increase their short-term debt and to adjust their hybrid claims towards using more tax deductible securities: Worse capitalized banks shift from mezzanine level items to subordinated debt. However, compared to the higher leverage ratio of better-capitalized banks, this effect is much smaller. Moreover, by differentiating between various forms of tax increases, I show that better-capitalized banks adjust their non-depository debt in reaction to income or franchise tax increases. No significant reaction is found for more temporary surcharge tax increases. Last, consistent with the leverage ratchet effect described by [Admati et al. \(2015\)](#), banks do not reverse their actions when they are exposed to tax declines.

Second, examining the asset side of the balance sheet, I document that, in the period of a tax increase, affected banks reduce their lending by 3.4%. The intuition behind this finding is that a higher tax rate increases a bank's cost of funding by raising its tax-adjusted cost of equity. If the profit for the marginal loan is zero prior to the tax change, a state tax increase renders the marginal loan unprofitable. The distinction between better- and worse-capitalized banks is again informative: It is primarily

worse-capitalized banks that reduce their loans and they do so by roughly 5.5%, as these banks do not have the ability to increase their debt. Looking at better-capitalized banks, I find that these banks use their financial flexibility to increase their lending in the period before the tax increase. However, similar to above, the differentiation between income and surcharge taxes is beneficial. In the year of an income tax increase, both worse- and better-capitalized banks reduce their loan supply, whereas no significant reduction is found for surcharge tax increases.

While the above described empirical strategy of using a quasi-natural experiment seeks to alleviate potential endogeneity concerns, one possible objection regarding these findings could be that unobservable state specific effects may influence the analysis. However, such an explanation is unlikely to be the main driver of the results. First, the empirical specification compares banks that are active within the same broad geographic region and includes several 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 of Chapter S banks is that they are not subject to corporate taxation. Hence, both the control and the treatment groups 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 neighboring state is chosen instead. Last, a number of sample splits and alternative regression specifications further illustrate the robustness of the overall results.

In this paper, I contribute to two broad literature strands: First, I add to the literature discussing the importance of corporate taxes for the financial sector. Second, I contribute to the literature discussing the role of capital requirements for the capital structure decisions of banks. While a growing number of recent empirical papers examine the capital structure of financial institutions (e.g., [Gropp and 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 (e.g., [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, for example, the overall tax burden, the tax rates paid, or the bank lending (e.g., [Buynak, 1987](#); [Neubig and Sullivan, 1987](#); [Kuprianov, 1997](#)). However, a general challenge when using such a nation-wide shock is to identify an appropriate comparison group, since the Reform Act was a federal law affecting all companies equally.<sup>2</sup> More recently, [Ashcraft \(2008\)](#) has highlighted the positive cross-sectional relationship between the effective state tax rate and the leverage ratio of U.S. banks. Similarly, [DeMooij and Keen \(2016\)](#) and [Gu et al. \(2015\)](#) use a panel estimation of international data to document that a favorable corporate tax treatment of debt is associated with higher bank leverage. Looking at tax changes, [Hemmelgarn and Teichmann \(2014\)](#) use a multinational setting and depict a positive relationship between taxes and the leverage decisions of international banks. In concurrent work, [Milonas \(2015\)](#) also studies how banks adjust their capital structure in response to tax changes. [Schepens \(2016\)](#) shows that a reduction in the tax discrimination between debt and equity financing in Belgium leads to better capitalized banks. Finally, looking at the asset side, [Smolyansky \(2016\)](#) shows that U.S. state-tax changes induce a reallocation of credit across states.

The remainder of the paper is organized as follows. [Section 2](#) develops the main hypotheses. The sample selec-

<sup>2</sup> An additional difficulty is that the reform had multiple side aspects, such as altering the amount of tax exempt securities, changing the minimum tax rate, or changing the investment tax credit, which make a clear cut analysis difficult. These early papers, in fact, often do not use any comparison group.

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