Geographic Deregulation and Bank Capital Structure

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Abstract:

Despite the vast literature demonstrating the many consequences of bank geographic deregulation, the literature on bank capital determinants completely disregards the effects of this deregulation. This paper fills this important research gap. We find strong evidence that geographic deregulation significantly increases both bank target capital ratios and speeds of adjustment to these targets. We also find a significant regime change towards more active capital management. Results are robust to numerous checks, including a gravity-deregulation approach with time-varying bank-specific instruments. In terms of policy implications, our findings suggest that deregulation policies may complement prudential policies, yielding improved financial stability.

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"Capital is a topic of never-ending importance to bankers and their counterparties, not to mention the regulators and central bankers whose job it is to oversee the stability of the financial system"

- Alan Greenspan, The Role of Capital in Optimal Banking Supervision and Regulation, Federal Reserve Bank of New York – Economic Policy Review, 1998.

1. Introduction

Policymakers around the world agree that bank capital represents a bulwark against unexpected shocks and systemic collapse, deserving close supervisory attention to foster a safe and sound banking system and reduce the likelihood of future crises (e.g., Greenspan, 1998; Bernanke, 2009; BIS, 2017; IMF, 2017). The banking literature confirms that capital is a key determinant for bank risk, helping absorb future losses and reduce moral hazard, and fortifying banks from failure and other problems engendered by financial crises (e.g., Kashyap, Rajan, and Stein, 2008; Hart and Zingales, 2011; Admati, DeMarzo, Hellwig, and Pfleiderer, 2013; Berger and Bouwman, 2013; Calomiris and Herring, 2013; Acharya, Mehran, and Thakor, 2016).[1] Hence, regulators enforce minimum bank capital standards, and supervisors monitor bank capital ratios closely. In contrast, bank managers generally rail against capital standards and argue that they reduce profits and market values. In this paper, we find policies other than explicit capital standards and supervisory discipline that policymakers may use to accomplish their goals of higher bank capital. In particular, we find that bank geographic deregulation can encourage bank managers to ***voluntarily*** choose higher capital ratios.

Bank geographic deregulation is a key policy and research topic which led to dramatic changes in the structure of the banking industry. A vast research literature analyzes consequences of bank geographic deregulation and finds mostly positive real economic effects from it, including higher income growth and output, accelerations in economic growth, tempering of business cycles, and reductions in income inequality (e.g., Jayaratne and Strahan, 1996; Morgan, Rime, and Strahan, 2004; Huang, 2008; Demyanyk, 2008; Levine, Levkov, and Rubinstein, 2008; Beck, Levine, and Levkov, 2010), favorable effects for firms (e.g., Black and Strahan 2002; Kerr and Nanda, 2009; Rice and Strahan, 2010; Krishnan, Nandy, and Puri, 2014), and favorable effects for households (e.g., Dick and Lehnert, 2010; Tewari, 2014; Kozak and Sosyura, 2015). Depite the importance of bank capital and the powerful consequences of geographic deregulation, the literature on bank capital determinants completely disregards the effects of this deregulation. This paper links the two literatures and fills this void.

To our knowledge, this is the first paper to analyze how the relaxation of regulatory restrictions on the geographic expansion of U.S. banks affects bank capital structure, while controlling for other major bank capital determinants. We examine these effects by using the deregulation of interstate bank branching

[1] We acknowledge that some literature alternatively argues that under certain circumstances, capital can also increase bank risk (e.g., Koehn and Santomero, 1980; Calem and Rob, 1999).

laws as in Rice and Strahan (2010) and Krishnan, Nandy, and Puri (2014), with recent updates from state statutes and the Dodd-Frank Act. We focus on the effects of this deregulation on banks' target capital ratios and speeds of adjustment to these targets. We also investigate methods of adjustment that banks employ to change their capital ratio after deregulation and potential channels behind some of the effects analyzed. Our focus on target capital and adjustment speeds eliminates confounding influences from historical and current events inherent in current capital ratios and may help address policy concerns about banks' responses to capital shortfalls.

By way of preview, we find that geographic deregulation resulted in banks ***voluntarily*** choosing higher target capital ratios and adjusting faster towards these targets. Analyzing banks' methods of adjustment, we find a significant regime change to more active capital management after interstate branching deregulation. These findings suggest that deregulation may have social benefits in terms of improving financial stability.

Before proceeding, it is important to recognize that bank capital ratios are bank decisions that are not simply determined by regulation and supervision. The bank capital literature finds that banks actively manage their capital structures (e.g., Marcus, 1983; Flannery, 1994; Diamond and Rajan, 2000; Berger, DeYoung, Flannery, Lee, and Öztekin, 2008; Flannery and Rangan, 2008; Allen, Carletti, and Marquez, 2011; Lepetit, Saghi-Zedek, and Tarazi, 2015). Several papers also find that banks generally set their target capital ratios well above the regulatory minimums, suggesting that capital regulation may be of only second-order importance to capital structure decisions (e.g., Ayuso, Pérez, and Saurina, 2004; Lindquist, 2004; Brewer, Kaufman, and Wall, 2008; Gropp and Heider, 2011). Some research also suggests that capital regulations do not affect bank capital adjustment speeds unless regulatory minimums are violated (e.g., Berger, DeYoung, Flannery, Lee, and Öztekin, 2008).

However, a major challenge in the bank capital structure literature is the endogeneity issue because bank capital is likely endogenously determined with other bank characteristics, making causal relations difficult to discern. We address the endogeneity concern by exploiting the staggered geographic deregulation of the U.S. bank branching laws, which provides excellent quasi-natural experiments. U.S. banks were geographically very restricted prior to 1978. From 1978 to 1994, many interstate and intrastate restrictions were lifted, but interstate branching remained prohibited. The 1994 Riegle-Neal Interstate Banking and Branching Efficiency Act legalized interstate branching, but left some restrictions up to individual states. We construct tests using the interstate bank branching deregulation events as plausibly exogenous shocks to the banking environment that affected banks in different states at different points in time.

We also acknowledge the possibility that geographic deregulation may also not be entirely

exogenous due to potential omitted variables and reverse causality concerns. For instance, omitted or unobservable factors that drive bank geographic diversification might also affect bank capital decisions. In addition, a reverse causality concern may also arise if banks in different states vary significantly in their capital targets, and such differences affected the deregulation. We address these concerns in several ways. We employ a variety of state-level controls, instrumental variables (IV) (factors identified in Kroszner and Strahan (1999; 2013) and Rice and Strahan (2010) to potentially affect deregulation, deregulation of adjoining states), difference-in-difference techniques, and falsification tests. We also follow some of the recent literature on bank deregulation (Michalski and Ors, 2012; Goetz, Leaven, and Levine, 2013, 2016; Chu, Deng, and Xia, forthcoming) and use an IV approach based on a gravity-deregulation model. This improved identification strategy integrates the staggered interstate bank branching deregulation into a gravity model to project bank deposit share in other expansion states. Then, we construct a time-varying bank-specific IV for bank geographic expansion/diversification based on the projected deposit shares in each expansion state. The main exogenous variation of the instrument arises from the staggered interstate bank branching deregulation shocks, pre-determined physical distance between a bank's headquarters and each expansion state capital, and the relative sizes of the home and expansion state. This allows us to tease out the causal effects of deregulation on bank capital decisions Across all these tests, we find robust results. Our findings are also robust to alternative deregulation and capital proxies and different model specifications, and hold in various subsamples.

Ex ante, it is ambiguous how geographic deregulation may affect banks' capital structure behavior. We propose sets of channels and competing hypotheses through which banks may react in choosing 1) target capital ratios, 2) capital adjustment speeds, and 3) capital adjustment methods. We then test among the competing hypotheses for each of these three outcomes.

Our empirical application employs partial adjustment models estimated using system generalized method of moments (GMM). We find robust evidence that deregulation causes bank target capital ratios to increase. After interstate branching deregulation, banks in states with the fewest restrictions on interstate branching choose capital ratios 2.9 percentage points higher than banks in states with the most restrictions, an economically large effect, given the sample mean of 8.9%. Our channels analysis suggests that the *charter value channel* is the most important to explain the results: banks that experience increases in their charter values from geographic deregulation may choose higher target capital ratios to protect these values. Furthermore, after the interstate branching deregulation, capital adjustment speeds are a predicted 9.4% faster for banks in the most deregulated states relative to those in the least deregulated states. These results hold in subsamples that allow for asymmetry in adjustment speeds for below- and above-target banks, alternative time periods, instruments, and falsification tests. Our channel analyses support the importance

of the *sensitivity to economic conditions channel* under which banks adjust faster to their target as they become more sensitive to economic conditions after deregulation.

We further find that after deregulation, banks adjust their capital ratios more using new equity issuances to change the numerators of the capital ratios rather than passive changes through their retained earnings, and also find some evidence of actively changing of assets in the denominators of the capital ratios. The relative importance of these methods of adjustment suggests a very significant regime shift after the interstate branching deregulation. We also find that banks with above- and below-target capital use very different capital strategies after deregulation. Those with above-target capital primarily rely on active asset management, while those with below-target capital use both active capital management and active asset management.

By conducting the first evaluation of the impact of interstate bank branching regulatory reforms in the U.S. on banks' capital decisions we add to several different strands of literature. First, as mentioned above, we add to the literatures on bank geographic deregulation and bank capital structure, which have not been linked together before. We also contribute more broadly to the literature on nonfinancial firm capital structure by focusing on an important industry that is often excluded from such empirical investigations. In this literature, there is only one paper examining the effects of industrial deregulation on nonfinancial firm capital structure targets (Ovtchinnikov, 2010). However, it does not study the effects of bank deregulation, nor does it examine speeds of adjustment and adjustment methods like we do. Furthermore, while nonfinancial firm capital structure is important, bank capital structure takes on special significance because banks are much more highly leveraged than other firms, bank capital ratios have devastating consequences for the real economy when they fall to distress or failure levels, and bank capital ratios are subject to regulatory and supervisory pressures that differ from nonfinancial firms. Finally, focusing on one industry with different deregulation conditions across markets and over time allows us to eliminate confounding differences across industries that are difficult to control for in multi-industry settings.

It is also important to acknowledge that there are three basic mechanisms through which bank geographic deregulation unleashed changes – increased competition, greater geographic expansion/diversification, and larger bank sizes. Thus, we also add to the strands of research linking these individual mechanisms to bank capital. Unexpectedly, there is little attention paid to the effects on bank capital of two of these three mechanisms through which geographic deregulation fundamentally changes the banking industry, competition and geographic expansion/diversification. Bank capital determination literature does not consider competition as a determinant, while some of the scarce other research that uses capital provides conflicting results and does not include target capital and speeds of adjustment like we do. The diversification literature has only some ancillary results for international diversification. As for bank

size, this is included in the studies of bank capital, but is generally only treated as a control variable. Section 2 provides more details on each of these literatures and our contributions.

Our findings also have policy implications. None of the many post-crisis regulations explicitly consider the effects of deregulation on bank capital structure. Our paper is the first to suggest that bank deregulation may have socially beneficial effects on bank capital structure, motivating banks to hold more capital, speed up their capital adjustments, and become more active in their adjustments. Thus, deregulation policies may be able to supplement prudential capital regulation and supervision.

The rest of the paper proceeds as follows. Section 2 describes our contributions to the literature. Section 3 develops our channels and hypotheses. Section 4 describes the data, identification strategy, model specification, and variables construction. Sections 5 and 6 present bank target capital and adjustment speed analyses, respectively. Section 7 analyzes methods banks use to adjust their capital ratios. Section 9 concludes. The Internet Appendix presents additional robustness checks.

2. Contributions to the Literature

As discussed above, the main goals of this paper are to investigate the effects of bank geographic deregulation on bank capital ratio targets and speeds of adjustment toward those targets. We also study methods of capital adjustment as well as explore a number of channels behind our findings. We contribute significantly to the bank geographic deregulation and bank capital literatures in important ways, as well as to several other key strands of bank and firm literatures.

2.1 Bank Geographic Deregulation

We begin our discussion with bank geographic deregulation, an important research and policy topic. Briefly, prior to 1978, U.S. banks were very restricted in their operations, with almost no interstate banking due to the McFadden Act of 1927 and limited intrastate banking due to state unit banking laws. Bank holding companies (BHCs) were also geographically restricted both across and within states. From 1978 to 1994, individual states started allowing BHCs to own commercial banks across state lines, but interstate branching remained prohibited (Berger, Kashyap, and Scalise, 1995). The 1994 Riegle-Neal Act is the final stage of a quarter-century-long effort to relax geographic limits on banks and allowed interstate branching for the first time, permitting BHCs to cross state lines and consolidate their commercial banks in different states into branches of a single bank (Jayaratne and Strahan, 1997). However, some restrictions, were left up to the individual states (Rice and Strahan, 2010). The 2010 Dodd-Frank Act,

Section 613, reversed one of the state restrictions on *de novo* branching by out-of-state banks.[2]

Geographic deregulation resulted in significant changes in the structure of the banking industry through three basic mechanisms – 1) increased competition, 2) greater geographic expansion/diversification, and 3) larger bank sizes. Each of these mechanisms may have important economic effects. A large literature finds mostly positive real economic effects from bank geographic deregulation. Jayaratne and Strahan (1996) first document a significant causal link between bank deregulation and state income growth and output. Others find that deregulation dampens business cycles and makes them more alike (Morgan, Rime, and Strahan, 2004), affects economic growth accelerations (Huang, 2008) and alters the distribution of income (e.g., Demyanyk, 2008; Levine, Levkov, and Rubinstein, 2008; Beck, Levine, and Levkov, 2010). Research that focuses on the effects on firms reports mostly favorable effects: deregulation spurs entrepreneurship (Black and Strahan 2002), promotes creative destruction (Kerr and Nanda, 2009), expands credit supply to small firms by reducing the cost of credit (Rice and Strahan, 2010), increases investment in the long-run (Zarutskie, 2006), and improves firm total factor productivity (Krishnan, Nandy, and Puri, 2014). However, some findings are mixed. One study finds externally-financed firm growth is increased for relatively financially unconstrained firms, but decreased for more constrained firms (Berger, Chen, El Ghoul, and Guedhami, 2018), and others find both increases and decreases in innovation (e.g., Amore, Schneider, and Žaldokas, 2013; Chava, Oettl, Subramanian, and Subramanian, 2013; Cornaggia, Mao, Tian, and Wolfe, 2015). Deregulation research on households finds increased lending (Dick and Lehnert, 2010), increased home ownership due to improved access to mortgage credit (Tewari, 2014), increased stock market participation (Kozak and Sosyura, 2015), and reduced share of unbanked households among low income populations (Célérier and Matray, 2016). We examine the effects of deregulation of interstate bank branching laws as in Rice and Strahan (2010) and Krishnan, Nandy, and Puri (2014), with recent updates from state statutes and Dodd-Frank Act. We advance this line of review by focusing on bank capital decisions, about which there is no evidence.

2.2 Bank Capital Structure

The bank capital literature is also extensive as well as research and policy relevant. As mentioned in the Introduction, capital is often considered the bulwark that keeps the banking industry safe and sound, and the bank failure literature confirms that banks with high capital ratios are largely protected from individual bank failure and the problems created by financial crises (Kashyap, Rajan, and Stein 2008; Hart and Zingales 2011; Berger and Bouwman, 2013).

While bank capital is subject to regulatory minimums, in practice, banks hold much more capital

[2] See https://www.federalreserve.gov/supervisionreg/srletters/SR1103.pdf.

than it is legally required. The bank capital literature also finds that in addition to regulation, banks' capital structures are influenced by financial factors (e.g., Berger, DeYoung, Flannery, Lee, and Öztekin, 2008) and governance pressures from bank stakeholders such as shareholders, debt holders, and depositors (e.g., Flannery and Sorescu, 1996; Morgan and Stiroh, 2001; Martinez Peria and Schmuckler, 2001; Calomiris and Wilson, 2004; Ashcraft, 2008; Flannery and Rangan, 2008; Lepetit, Saghi-Zedek, and Tarazi, 2015).

Surprisingly, despite the demonstrated importance of bank geographic deregulation, the literature on bank capital determinants completely disregards the effects of bank geographic deregulation. To our knowledge, none of the research on bank capital determinants includes geographic deregulation.

2.3 Firm Capital Structure

We also contribute to the broader firm capital structure literature. This literature is dominated by four major capital structure theories (see reviews by Harris and Raviv, 1991; Frank and Goyal, 2003): static tradeoff theory (e.g., Kraus and Litzenberger, 1973; Jensen and Meckling, 1976; Myers 1977; Jensen, 1986), dynamic tradeoff theory (e.g., Hennessy and Whited, 2005; Leary and Roberts, 2005; Strebulaev, 2007), pecking order theory (e.g., Myers, 1984; Myers and Majluf, 1984), and market timing theory (e.g. Baker and Wurgler, 2002). All theories have some empirical support (e.g., Frank and Goyal, 2003; Flannery and Rangan, 2006; Lemmon, Roberts, and Zender, 2008; Frank and Goyal, 2009; Huang and Ritter, 2009; Öztekin and Flannery, 2012; DeAngelo and Roll, 2015). Our paper falls in the dynamic tradeoff category.

We are also only aware of one paper on the effects of industrial deregulation on nonfinancial firm capital structure targets (Ovtchinnikov, 2010). However, it does not study the effects of bank deregulation, nor does it examine speeds of adjustment and capital adjustment methods like we do. Our study also has the benefit of focusing on a single industry, which enables us to circumvent confounding differences across industries.[3]

2.4 Bank Geographic Deregulation Mechanisms: Competition, Geographic Expansion/Diversification, and Size

Perhaps even more surprising, there is little attention paid to the effects on bank capital of two of the three mechanisms through which bank geographic deregulation fundamentally changes the banking industry, competition and geographic expansion/diversification. As discussed below, only bank size is included in the studies of bank capital, and this is only treated as a control variable.

[3] For instance, DeAngelo, DeAngelo, and Whited (2011) show that firms with flexible technologies can have slow adjustment speeds if they get a series of shocks that optimally take them away from the target. Focusing only on one industry with similar technologies helps avoid such confounding differences in the speed of adjustment estimates.

2.4.1 Bank Geographic Deregulation Mechanisms: Competition

None of the bank capital determination literature cited above includes any measures of bank competition, despite the fact that competition is such a large theme in the banking literature more generally. A very limited part of an additional literature estimates the effects of competition on bank capital and finds contradictory results.

Schaeck and Cihák (2012) measure competition using the Panzar and Rosse (1987) H-statistic in the European context, a measure that is related to the ability of banks to mark up prices on their products. They find that more competition increases bank capital ratios. Two other international studies, Berger, Klapper, and Turk-Ariss (2009) and Beck, De Jonghe, and Schepens (2013), are part of a different literature on the relations between bank competition and stability that is discussed more broadly below, but explore the effects of competition on bank capital in ancillary tests. These two studies focus on the effects of the Lerner Index, which inversely measures competition, on financial stability, measured by the bank Z-score. They additionally use the capital ratio as dependent variable because it is a component of the Z-score. Beck, De Jonghe, and Schepens (2013) find that more competition (lower Lerner Index) reduces bank capital ratios and Berger, Klapper, and Turk-Ariss (2009) find nonmonotonic effects that depend on the level of the Lerner Index. None of these three studies uses U.S. geographic deregulation.

A significant limitation of these studies is that they measure the effects of competition on the banks' actual capital ratios, rather than target capital ratios and speeds of adjustment to the targets. Banks generally do not have the exact capital ratios they desire at any given time because capital ratios are difficult and expensive to adjust quickly and are buffeted about considerably by earnings shocks and credit losses that are virtually impossible to control in the short term. Thus, actual capital ratios are combinations of historical and current events as well as the bank's intentions. Much of the literature on bank capital determination for more than the last decade has recognized that more meaningful results are possible from studying target capital ratios and speeds of adjustment, which eliminates significant noise and biases from the effects of other events that affect actual capital ratios.

2.4.2 Bank Geographic Deregulation Mechanisms: Bank Geographic Expansion/Diversification

There is also little research on the effects of geographic expansion/diversification on bank capital. A partial exception is Berger, El Ghoul, Guedhami, and Roman (2017) which analyzes effects of the internationalization of U.S. banks on bank risk. In an ancillary test, they also look at capital as a component of Z-score. The authors find that bank internationalization is associated with higher equity capital ratio, which they argue it is likely designed to offset risks from investing in other countries.

2.4.3 Bank Geographic Deregulation Mechanisms: Bank Size

Finally, the bank capital literature does consider the effect of bank size, but only includes it as a control variable. The literature does not focus on the effect of bank size on capital, because the effect was already well known before the bank capital determination literature. Larger banks tend to have lower capital ratios because they are generally better diversified and because they are typically viewed as more protected from failure by too-big-to-fail and other size-related access to the government safety net (e.g., Demsetz and Strahan, 1997; Hughes and Mester, 2013). For example, Demsetz and Strahan (1997) show that larger BHCs manage to hold less capital and are able to pursue higher-risk activities. We contribute to this strand of the literature by showing that our capital structure results hold for both large and small banks.

Thus, this paper contributes to five different strands of bank literature – bank geographic deregulation, bank capital structure, bank competition and capital, bank geographic expansion/diversification, and bank size and capital. We also add to the broader literature on firm capital structure by including for the first time geographic deregulation and analyses of capital structure and speeds of adjustment.

3. Hypothesis Development

As discussed in the Introduction and Section 2, bank geographic deregulation can lead to more intense competition, increased geographic expansion/diversification, and greater bank sizes. We present three sets of hypotheses for the effects of geographic deregulation on 1) bank target capital ratios, 2) adjustment speeds, and 3) methods of capital ratio adjustment. We also formulate channels through which the effects function.

Three channels predict increases or decreases in the target capital ratios for banks exposed to more intense geographic deregulation:

> ***Charter value*:** Deregulation may lead to a more dynamically competitive industry in which banks are better able to engage in consolidation activities that may improve scale and/or X-efficiencies (Jayaratne and Strahan 1996, 1998; Berger and Mester, 1997; Berger and Hannan, 1998; Dick, 2006; Hughes and Mester, 2013), and/or diversify geographically to reduce risk (Diamond, 1984; Boyd and Prescott, 1986; Calomiris, 2000; Goetz, Laeven, Levine, 2016; Jiang, Levine, Lin, 2017). The higher efficiency and lower risk may contribute to more valuable future profit streams and/or increased survival probabilities, and therefore higher bank charter values (Kwan and Laderman, 1999; Mester, Hughes, Lang, and Moon, 1999; Akhigbe and Whyte, 2003; Deng and Elyasiani, 2008). Banks may target higher capital ratios to protect these higher charter values (Marcus, 1984; Demsetz,

Saidenberg, and Strahan, 1996; Galloway, Lee, Roden, 1997; Hellmann, Murdock, and Stiglitz, 2000).

In contrast, however, deregulation may reduce future bank profit margins, make banks riskier, and decrease survival probabilities, resulting in lower charter values and reduced target capital ratios (Bain, 1956; Keeley, 1990; Demsetz and Strahan, 1997; Acharya, Hasan, and Saunders, 2006).[4]

***Cost of capital*:** Deregulation may raise target capital ratios due to lower cost of capital. It may be easier to raise capital internally because of higher bank earnings (Myers, 1984; Myers and Majluf, 1984; Chong, 1991; Berger, 1995; Hortlund, 2005; Flannery and Rangan, 2008). It may also be less expensive to raise external equity due to geographic diversification of bank assets and because investors favor more profitable, safer, and larger firms (Hennessy and Whited, 2007).

In contrast, deregulation may decrease target capital ratios because of higher internal and external costs of capital. Analogous to the arguments above, lower profitability and/or higher risk may make it more difficult to retain equity internally and/or more expensive to raise external equity from investors.

***Agency problems*:** Geographic deregulation may increase agency problems because increased competition, expanded diversification opportunities, and increased size give additional chances for banks' shareholders to take on excessive risk to increase returns at the expense of creditors (Berger and Ofek, 1996; Servaes, 1996; Denis, Denis, and Sarin, 1997). To mitigate these shareholder-creditor agency problems, bank management may respond by increasing target capital ratios (Bhattacharya, Boot, and Thakor 1998; Merton, 1977; Thakor, 2014).

Alternatively, geographic deregulation and its mechanisms may exacerbate shareholder-manager agency problems. Managers may have more opportunities to engage in negative net present value activities, such as empire-building consolidation to increase pay and/or prestige (Jensen, 1986; Jensen and Murphy, 1990; Stulz, 1990; Morellec, Nikolov, and Schürhoff, 2012; Liao, Mukherjee, and Wang; 2015). In response, bank shareholders may encourage lower target capital ratios to keep more pressure on bank managers to focus on value maximization (Zwiebel, 1996).

[4] Very large banks may also target lower capital ratios because of too-big-to-fail protection (Berger, DeYoung, Flannery, Lee, and Öztekin, 2008).

These channels imply two opposing hypotheses for the effects of geographic deregulation on target capital ratios:

H1a: Geographic deregulation results in higher target capital ratios for banks in more deregulated states.

H1b: Geographic deregulation results in lower target capital ratios for banks in more deregulated states.

Deregulation may also affect adjustment speeds toward target capital ratios. We propose two channels that predict changes in the adjustment speeds:

> ***Regulatory and market discipline*:** Deregulation creates the necessity for more monitoring to deal with increased opportunities and complexity of bank operations (Houston and James, 1995; Kole and Lehn, 1999; Becher, Campbell, and Frye, 2005; Becher and Frye, 2011). Banks may adjust faster to target capital ratios after deregulation because prudential regulators and market participants exercise additional discipline in the face of greater deregulation. The pressure from regulators may be more in the form of implicit costs, while costs imposed by market participants are generally more in the form of higher interest rates and reduced availability of funds for riskier institutions (Gilson, 1997; Hennessy and Whited, 2005, 2007).
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> Conversely, monitoring by regulators and market participants may decrease following deregulation (e.g., Becher and Frye, 2011). Banks may adjust more slowly to target capital ratios after deregulation in the presence of decreased regulatory and/or market incentives to adjust quickly (Berger, DeYoung, Flannery, Lee, and Öztekin, 2008).
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> ***Sensitivity to economic conditions*:** Theory predicts and empirical evidence confirms the positive association between the adjustment speed and economic conditions (e.g., Hackbarth, Miao, Morellec, 2006; Cook and Tang, 2010). Banks may adjust to their target capital ratios faster if they become more sensitive to changes in economic conditions after deregulation. Deregulation may encourage banks to raise capital faster under more favorable economic conditions because such conditions provide better investment opportunities and reduce costs of raising capital (Hackbarth, Miao, Morellec, 2006; Erel, Julio, Kim, Weisbach, 2011).
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> In contrast, banks may become less sensitive to economic conditions after deregulation, leading to slower adjustment. Lower sensitivity may be due to an increase in government guarantees (Baron, 2017) or a decrease in the importance of external capital if internal

capital generation from retained earnings is improved after deregulation (DeYoung and Li, 2018).

These channels imply the following opposing hypotheses for the effects of geographic deregulation on capital adjustment speed of banks in deregulated states:

H2a: Geographic deregulation results in <u>faster capital adjustment speed</u> for banks in more deregulated states.

H2b: Geographic deregulation results in <u>slower capital adjustment speed</u> for banks in more deregulated states.

Finally, capital ratio adjustments caused by geographic deregulation may be primarily achieved through one of the following channels:

***Active capital management*:** Capital ratio changes may be achieved actively through capital market operations (new equity issuances, stock repurchases, or dividend changes) to change the numerator of the capital ratios. However, changing capital ratios substantially in short periods of time in this fashion may be expensive in terms of risk premiums and administrative costs (Leland and Pyle, 1977; Campbell and Kracaw, 1980; Calomiris and Kahn 1991).

***Passive capital management*:** Capital ratio changes may be achieved passively through earnings retention. Passive capital management is generally slower to change the capital ratios but is less expensive than the active methods (Myers, 1984; Myers and Majluf, 1984).

***Active Asset management*:** Capital ratio changes may also be achieved by managing bank assets. Asset management by changing the denominator of the capital ratios is the fastest to implement of the adjustment methods. It may be used to change capital ratios, but generally by less than active capital management and may involve significant losses in interest income, bank liquidity, and/or opportunity costs of foregoing growth (Andersen and Burger, 1969).

Thus, we offer the following three hypotheses:

H3a: Geographic deregulation results in <u>more active capital management</u> for banks in more deregulated states.

H3b: Geographic deregulation results in <u>more passive capital management</u> for banks in more deregulated states.

H3c: Geographic deregulation results in more active asset management for banks in more deregulated states.

We test which of these hypotheses (**H3a**, **H3b**, **H3c**) have empirical support.

4. Data and Methodology

4.1 Data and Sample

We use annual financial data for all U.S. bank holding companies (BHCs) over 1986 to 2014 available from the Federal Reserve's Y-9C Reports.[5] For expositional convenience, we refer to these institutions as banks. We also collect information on market equity and S&P Credit Ratings from Compustat, M&A and acquisition (M&A) data from the Federal Reserve Bank of Chicago, and deposit data from the FDIC Summary of Deposits. We have an unbalanced panel containing 9,072 bank-year observations over 28 years, for about 350 banks per year on average, accounting for over 86% of bank industry assets as of 2014.

4.2 Identification Strategy

As mentioned in the Introduction, identifying the causal effects of geographic deregulation on bank capital can be challenging. Unobservable state characteristics related to both local deregulation and bank capital decisions could drive the results. Alternatively, reverse causality may arise if banks in different states vary significantly in their capital targets, and such differences affect deregulation.

Our main identification strategy is to exploit the staggered deregulation of bank geographic deregulation laws in the U.S., which generate plausibly exogenous variation in the banking environments. We are able to take advantage of multiple shocks that affect different states at different times. To further mitigate endogeneity concerns, we model bank capital ratios using a partial adjustment methodology with bank-specific and time-varying target ratios and heterogeneous adjustment to the targets.[6] The dynamic models treat right-hand side bank-level controls as endogenous and employ all valid lags of these variables as instruments in the regressions, while controlling for a variety of bank capital determinants, as well as bank and year fixed effects. In additional robustness tests, we employ alternative estimation methodologies, instrumental variables (IV) including a gravity deregulation approch, falsification tests, and difference-in-difference technique to further enhance the credibility of our empirical analysis (Section 5.2.2).

[5] Before 2006, all BHCs with at least $150 million in total assets filed these quarterly reports. Beginning with the March 2006 reports, the cutoff for mandatory filing was raised to $500 million. In 2015, this cutoff was further increased to $1 billion.

[6] Some studies question the reliability of the speed of adjustment estimates derived from a partial adjustment model (e.g., Shyam-Sunder and Myers, 1999; Chen and Zhao, 2007; Chang and Dasgupta, 2009; DeAngelo, DeAngelo, and Whited, 2011; Graham and Leary, 2011; Hovakimian and Li, 2011, 2012; Iliev and Welch, 2015). This study exploits the heterogeneity in the estimated adjustment speeds over time and across banks, rather than focusing on the absolute level of the speed of adjustment, which is the major concern of most aforementioned studies.

4.3 Main Variables

Table 1 contains definitions and summary statistics of all of the variables used in this study. Appendix, Figures A1 and A2 plot our variables of interest ― geographic deregulation and capital ratios ―over time.

4.3.1 Capital Measures

Our main capital measure (k) is *Equity Ratio*, equity capital divided by total unweighted assets. In robustness tests, we use three alternative measures: *Leverage Ratio* (Tier 1 capital divided by total unweighted assets), *Tier 1 Capital Ratio* (Tier 1 capital divided by risk-weighted assets), and *Total Capital Ratio* (Tier 1 plus Tier 2 capital divided by risk-weighted assets).[7]

4.3.2 Deregulation Measures

To proxy for bank deregulation, we follow Rice and Strahan (2010) and Krishnan, Nandy, and Puri (2014) and construct several indices of interstate branching restrictions. We extend the Rice-Strahan Index and the Krishnan, Nandy, and Puri Index which stopped in 2005 to 2014 by manually searching individual state statutes and updates from the 2010 Dodd Frank Act. As described in Rice and Strahan (2010), the 1994 Riegle-Neal Act allowed states to erect several barriers to protect in-state banks from out-of-state competition. Specifically, states could: (i) set a minimum age requirement (typically three or five years) for the target institution in acquisitions (*Minimum Age*); (ii) prohibit *de novo* interstate branching (*DeNovo Branching*); (iii) disallow acquisition of individual branches (*Acquisition*); and (iv) impose a statewide deposit cap of the same as or smaller than the national Riegle-Neal default of 30% on interstate M&As and branch acquisitions (*Deposit Cap*). The state-level Rice-Strahan Index is the sum of the restrictions and ranges from zero (most open toward interstate entry) to four (most restrictive), so lower values denote more deregulation. Our primary measure of geographic deregulation is *R&S Index*, the weighted Rice-Strahan Index of interstate banking deregulation at the bank-level, where the weights are based on the proportions of bank deposits in each state in which the bank operates.[8]

We also use an alternative measure, the Krishnan, Nandy, and Puri Index (*KNP Index*), which adds an additional restriction for reciprocity between states, allowing a particular action by an out-of-state bank as long as the laws of the home state of that out-of-state bank allows the same action. This index ranges from zero to five. In addition, we decompose *R&S Index* and *KNP Index* into their subcomponents to understand the mechanisms underlying our findings.

The Riegle-Neal Act was preceded by early state-level deregulations of intrastate and interstate

[7] Risk-weighted assets is a weighted sum of a bank's assets and off-balance-sheet exposures, in which the weights are based upon perceived credit risks as per the original Basel Accord. Tier 1 and Tier 2 capital are also specified in the Basel Accord.

[8] We use deposits from the Summary of Deposits (SoD) for weights because deposits is the only bank product for which there is complete locational information.

banking expansions (e.g., Jayaratne and Strahan, 1996; Black and Strahan, 2002; Cetorelli and Strahan, 2006). Early intrastate banking deregulation allowed banks to branch statewide by either acquiring existing branches or establishing new ones, while early interstate banking deregulation allowed bank holding companies to buy and operate banks chartered in other states. Both intrastate and interstate deregulation reduce local barriers to entry to other in-state and out-of-state banking organizations. To account for these additional deregulatory events which occurred early in our sample period, we control for them in all regressions. State-level intrastate index is a dummy equal to 1 in the years after the state implemented intrastate banking deregulation (Jayaratne and Strahan, 1996), and state-level interstate index is a similar dummy for interstate banking deregulation by banks (Black and Strahan, 2002). The bank-level intrastate (*Intra*) and interstate (*Inter*) indices we use are the weighted values of their state-level counterparts, where the weights are based on the proportions of bank deposits in each state.

4.3.3 Control Variables for Target Capital

We include a number of control variables as in Berger, DeYoung, Flannery, Lee, and Öztekin (2008) for target capital. To isolate the bank's active capital adjustments, we control for a pre-determined measure of "do-nothing capital" (*DNK*). *DNK* represents what the capital ratio would be if the bank did not engage in net capital market activities, but simply keeps dividend payments constant and lets the remaining cash flow accrue to capital.

We include several other proxies to capture differences in charter value: *Market-to-Book* ratio, a typical proxy of charter value, as well as *Retail Deposits, Business Loans,* and *Off-Balance-Sheet.* Banks with more valuable charters may hold more capital to protect their future profit streams. A greater reliance on retail deposits should reduce pressure from counterparties to hold capital. At the same time, a greater endowment of (core) depositors may increase the bank's charter value and induce it to hold more equity as protection. Corporate borrowers may prefer to deal with banks with higher capital that increases banks' incentives to monitor and protects bank-borrower relationships. Banks with many derivative contracts may hold more capital against exposure to counterparty risk, but they may carry less capital if these positions are used to hedge risk of their other operations.

We also employ proxies of bank performance and risk: return on assets (*ROA*), standard deviation of *ROA* (*StdvROA*), and *Cost Efficiency.* These variables reflect two potentially offsetting effects. More profitable, safer, and efficient banks may choose lower equity ratios because of lower expected costs of bankruptcy and lower need to absorb losses. Alternatively, more profitable, safer, and efficient banks may choose higher capital ratios to protect their greater franchise values.

Finally, we control for banks' growth opportunities. Higher capital allows banks to engage in future

expansion opportunities when they arise.[9] We control for bank acquisition strategies based on their actual pattern of acquisitions in the near future, *M&A*. We also control for bank size, *Ln(Assets)*. Larger banking organizations are likely to hold relatively less capital due to greater diversification, scale economies in risk management, greater ability to raise equity on short notice, and/or a "too-big-to-fail" expectation for the largest institutions.

4.3.4 Control Variables for Capital Adjustment Speed

We include additional determinants for bank capital adjustment speed. To account for the bank's initial capital position relative to its target and regulatory pressures to increase capital, we include *Undercapitalized*. Distressed banks may also raise capital more rapidly in response to extraordinary external pressures. We measure bond market pressure using S&P's bond ratings and create three binary variables: *BBB*, *Junk*, and *Missing Rating*. A rating above BBB is the excluded category. We also control for *GDP Growth* and *Inflation*, as macroeconomic conditions have been shown to affect capital adjustment speeds for nonfinancial corporations (e.g. Drobetz and Wanzenried, 2006; Cook and Tang, 2010).

4.3.5 Summary Statistics

In Table 1 Panel A, banks have a mean *Equity Ratio* of 0.089, indicating that the average bank is well capitalized. Panel D shows means of the other capital ratios used for robustness, *Leverage Ratio* (0.089), *Tier 1 Capital Ratio* (0.126), and *Total Capital Ratio* (0.142). *Do-Nothing Capital* ratios are below their corresponding capital ratios, suggesting that on average, sample banks intentionally raised capital.

Turning to our geographic deregulation variables, in Panel B, the average bank has *R&S Index* of 2.086, *KNP Index* of 2.689, *Minimum Age* restriction of 0.650, *DeNovo Branching* restriction of 0.544, *Acquisition* restriction of 0.524, *Deposit Cap* restriction of 0.369, and *Reciprocity* restriction of 0.603.

In terms of controls, in Panel C, the average bank has early intrastate deregulation index (*Intra*) of 0.989, early interstate deregulation index (*Inter*) of 0.994, *Market-to-Book* ratio of 1.481, *Retail Deposits* ratio of 0.612, *Business Loans* ratio of 0.262, *Off-Balance-Sheet* ratio of 0.034, *ROA* ratio of 0.009, *StdvROA* of 0.004, *Cost Efficiency* ratio of 0.663, number of acquisitions in the subsequent year (*M&A*) of 0.048, and *Ln(Assets)* of 14.498. About 48.1% of the banks have capital ratios below their target (*Undercapitalized*). In addition, only about 0.1% of the banks have a bond rating of BBB- or below (*Junk*), 6.3% have a bond rating of *BBB*, 82.4% have missing credit rating, while the remaining are banks with ratings above BBB (the omitted category). Macroeconomic conditions show average *GDP Growth* of 2.582 and *Inflation* of 2.202.

There is significant time-series variation within states in both geographic deregulation and capital

[9] Expansion opportunities allow banks to increase risks, and thus can increase agency problems among stakeholders.

ratios. Appendix, Figures A1 and A2 show how deregulation (as proxied by the *R&S Index* and the *KNP Index*) and capital ratios (*Equity Ratio*) evolve over time by plotting their yearly averages over the sample period.

4.4 Main Model Specification

We model target capital ratio $k_{i,t}^{*}$ as a function of the banks' geographic deregulatory environment, bank characteristics, bank and year fixed effects:

$$k_{i,t}^{*} = \frac{K_{i,t}^{*}}{A_{i,t}} = \theta DEREG_{i,t-1} + \beta X_{i,t-1} + \psi BANK_i + \tau YEAR_t \quad (1)$$

where:

$K_{i,t}^{*}$ is the target (desired) book value of equity capital,

$A_{i,t}$ is the book value of assets,

$DEREG_{i,t-1}$ represents lagged geographic branching deregulation indices that affect target capital, described in Section 4.3.2.

$X_{i,t-1}$ is a set of early deregulation indices, described in Section 4.3.2, as well as bank characteristics, including market-to-book ratio, retail deposits, business loans, off-balance sheet activities, profitability, risk, cost efficiency, number of acquisitions, and size, described in Section 4.3.3.

$BANK_i$ and $YEAR_t$ are bank and time fixed effects to capture the effects of unobserved bank heterogeneity and time-varying factors.

Because adjusting capital is costly, we use a partial adjustment framework. We start with "do-nothing capital" or *DNK,* what the capital ratio would be if the bank was passive and "did nothing," kept dividend payments constant at last year's rate and let remaining earnings accrue to capital. It is constructed as lagged capital $K_{i,t-1}$ plus current net income $NI_{i,t}$ minus lagged dividends $DIV_{i,t-1}$, all divided by current assets $A_{i,t}$. We assume that the bank closes $\lambda \in [0,1]$ proportion of the gap between its target capital ratio ($k_{i,t}^{*}$) and *DNK* in each year. The value of λ increases from 0 to 1 as banks move from perfectly passive managers with no action (λ=0) to perfectly active managers that adjust their capital ratios immediately to the target (λ=1). We initially take λ as constant, and later relax this assumption.

The bank's active adjustment is $\Delta k_{i,t} = k_{i,t} - DNK_{i,t}$ and is undertaken through new equity issues, stock repurchases, changes in dividend payments, or adjustments to assets. It is calculated as a weighted average of its target capital ratio, $k_{i,t}^{*}$, and its do-nothing (passive) capital ratio, $DNK_{i,t}$, as well as a random shock, $\tilde{\delta}_{i,t}$:

$$\Delta k_{i,t} = k_{i,t} - DNK_{i,t} = \lambda \left(k^*_{i,t} - DNK_{i,t}\right) + \tilde{\delta}_{i,t} \quad (2)$$

where:

$k_{i,t}$ = book value of equity capital $K_{i,t}$ divided by assets $A_{i,t}$,

$DNK_{i,t}$ = "do-nothing capital ratio" at time $t \equiv \left(\frac{K_{i,t-1} + NI_{i,t} - DIV_{i,t-1}}{A_{i,t}}\right)$,

$NI_{i,t}$ = net income of the i^{th} bank in the current period,

$DIV_{i,t-1}$ = dividend payments by the i^{th} bank in period *t-1*,

λ is the adjustment speed, and

$\tilde{\delta}_{i,t}$ is a random error.

We substitute (1) into (2) and rearrange it to isolate the capital ratio:

$$k_{i,t} = (\lambda\beta)X_{i,t-1} + (\lambda\theta)DEREG_{i,t-1} + (1-\lambda)DNK_{i,t} + \mu\, BANK_i + \Upsilon\, YEAR_t + \tilde{\delta}_{i,t} \quad (3)$$

Following Berger, DeYoung, Flannery, Lee, and Öztekin (2008) and Flannery and Hankins (2013), we estimate Equation (3) using Blundell and Bond's (1998) generalized method of moments (GMM) estimator to avoid biases from OLS or standard fixed effects models.[10] The inclusion of bank ($BANK_i$) and year ($YEAR_t$) fixed effects capture the effects of unobserved bank heterogeneity and time-varying factors such as macroeconomic and financial market conditions, as well as regulatory events, including changes in capital standards, that affect all banks at the same points in time (e.g., Gropp and Heider, 2011; De Jonghe and Öztekin, 2015). The adjustment speed λ is obtained by subtracting the coefficient estimate on the do-nothing-capital ($DNK_{i,t}$) from 1. The long-run impact of *COMP* on the capital ratio is given by its estimated coefficient, divided by λ (e.g., Flannery and Rangan, 2006; Lin and Flannery, 2013).

This estimation provides estimates of β, θ, and λ, which allows us to calculate target capital ratios and deviations from the target capital ratios for each bank-year:

$$\hat{k}^*_{i,t} = \theta DEREG_{i,t-1} + \beta X_{i,t-1} + \psi BANK_i + \tau\, YEAR_t = \left(\frac{1}{\lambda}\right)(\hat{k}_{i,t} - (1-\lambda)DNK_{i,t}) + \hat{\delta}_{i,t} \quad (4)$$

$$\widehat{DEV}_{i,t} = \hat{k}^*_{i,t} - DNK_{i,t} \quad (5)$$

We next relax the restrictive assumption of a constant adjustment speed λ for all banks at all times.

[10] We employ Ordinary Least Squares (OLS) to test the sensitivity of our results to the econometric specification and our results (not reported) are consistent. We opt to use Generalized Methods of Moments (GMM) estimators as it is well established in the literature that OLS estimates are biased and inefficient in the presence of dynamism (partial adjustment) and firm heterogeneity.

We thus allow λ to vary with deregulation and bank characteristics and other exogenous market factors:

$$\lambda_{i,t} = \Lambda Z_{i,t-1} = \vartheta DEREG_{i,t-1} + \gamma \Omega_{i,t-1} \tag{6}$$

We investigate a partial adjustment model in which bank characteristics and geographic deregulation affect both the target capital ratio and the speed of adjustment. We substitute (6) into (3) and rearrange it:

$$\Delta k_{i.t} = \left(\Lambda \mathrm{Z}_{i,t-1}\right)\left(\theta DEREG_{i,t-1} + \beta X_{i,t-1} - DNK_{i,t}\right) + \psi\, YEAR_t + \tilde{\delta}_{i,t} \tag{7}$$

where:

Λ is a vector of coefficients for the adjustment speed function, and

$Z_{i,t-1}$ is a set of adjustment speed factors, including $DEREG$ which contains the same geographic deregulation variables as above; early deregulation indices as before; and other bank and market factors (Ω) which includes initial capital adequacy (measured relative to the target capital), bond ratings, GDP growth, inflation, described in Section 4.3.4; and year fixed effects.[11]

We estimate Equation (7) as follows. First, we assume λ is constant and estimate Equation (3) using system GMM and extract an estimate of target capital ratio according to Equation (4), which uses Equation (1) and the predicted values from Equation (3). All standard errors are clustered at bank level and are computed using the Windmeijer (2005) correction. Hence, they are robust to heteroscedasticity and autocorrelation within banks.[12] We then use these results to calculate each bank's deviation from its estimated target capital ratio, $\widehat{DEV}_{i,t}$, using Equation (5) and substitute this deviation in Equation (7) to obtain:

$$\Delta k_{i.t} = \left(\Lambda \mathrm{Z}_{i,t-1}\right)\left(\widehat{DEV}_{i,t}\right) + \psi\, YEAR_t + \tilde{\delta}_{i,t} \tag{8}$$

This final step involves a pooled OLS regression of $\Delta k_{i,t}$ on a set of variables defined as the product of $\widehat{DEV}_{i,t}$ and the above-mentioned covariates affecting the adjustment speed, with bootstrapped standard errors (robust to heteroscedasticity and autocorrelation) to account for the generated regressor (Pagan, 1984 and Faulkender, Flannery, Hankins, and Smith, 2012). The vector of estimated coefficients allows us to test various hypotheses on the determinants of the adjustment speed, and in particular, the effect of bank

[11] We use the typical controls for the adjustment speeds common in the literature. We also experiment with several other different subsets, and our results are not generally sensitive to these alternative specifications.

[12] The clustering of the standard errors at the state-level somewhat reduces the *t*-statistics, but does not alter the statistical significance level of the coefficient estimates.

geographic deregulation on the speed of adjustment.[13]

5. Empirical Results for the Effects of Geographic Deregulation on Bank Target Capital

5.1 Deregulation and Target Capital: Main Results

Table 2 shows the main results for Equation (3) and tests of **Hypotheses H1a: Higher Target Capital Ratio** versus **H1b: Lower Target Capital Ratio**. Columns (1) and (2) present results using *R&S Index* and *KNP Index*, respectively. Columns (3) – (7) examine the individual components of *R&S Index* and *KNP Index*. The deregulation terms for these indices are negative and statistically significant at the 1% level, suggesting that geographic deregulation – proxied by less strict bank branching restrictions – is associated with higher bank target capital ratios. The findings for the controls are generally consistent with the existing literature, but we do not discuss them for brevity.

These results are consistent with the empirical dominance of **Hypothesis H1a: Higher Target Capital Ratio** over **H1b: Lower Target Capital Ratio**. They are also economically significant. Using *R&S Index*, banks in states that are most open to interstate branching (*R&S Index* = 0) choose a target capital ratio 2.9 percentage points ((0.0027/(1-0.6353)) × 4) higher than banks in states with the most restrictions (*R&S Index* = 4), which is large in magnitude relative to the capital ratio mean of 8.9%.

5.2. Deregulation and Target Capital: Robustness Tests

We provide a number of robustness tests of the target capital results. We focus here on *R&S Index*, but show similar results in Appendix, Table A1 for *KNP Index*.

5.2.1 Alternative Measures of Deregulation and Capital, Endogeneity Tests, and Subsample Analyses

Table 3 Panel A, provides robustness checks using alternative measures of deregulation and capital, different empirical specifications, and subsample results.

Column (1) uses *R&S Index HDQ* for the bank's headquarters state rather than the weighted average across the states where the bank has deposits, and the findings are virtually identical. In Columns (2) – (4), we examine three alternative measures for bank capital: *Leverage Ratio*, *Tier 1 Capital Ratio*, and *Total Capital Ratio*, along with their corresponding *Do-Nothing Capital* measures. Our results continue to hold and are statistically significant at the 1% level in all cases.

In Columns (5) – (10), we treat deregulation as endogenous. In Column (5), we add state fixed effects as instruments for deregulation. In Column (6), we instrument deregulation with its own lags and

[13] Modelling target capital and the speed of adjustment sequentially in separate equations is a common practice in the empirical capital structure literature. The reason is that combining equations would result in a highly nonlinear model, which could be subject to significant measurement errors.

several state-level conditions that may have favored state deregulation as in Kroszner and Strahan (1999; 2013) and Rice and Strahan (2010). First, we include four factors that may be related to the timing and level of state intrastate bank branching reforms: *Small Bank Share,* the ratio of branches of small banks with total assets ≤ $1 billion in the state; *Relative Size Insurance,* the ratio of value added from insurance to value added from insurance plus banking; *Fraction Small Establishments,* the fraction of total establishments with fewer than 20 employees in the state; and *Unit Banking Law,* a dummy for whether the state had unit banking regulation in 1979 that required each bank to be confined to a single building.[14] We also include two political indicators: *Democrat Governor,* an indicator if the state Governor is a Democrat; and *Democrat Legislature,* an indicator if the majority of State Legislators are Democrats. In Column (7), we instrument deregulation with its own lags, the state-level instruments from Column (6), and state fixed effects. In Column (8), we aggregate bank-level financial data at the state-level and then estimate our regressions at the state-level, while instrumenting deregulation with its own lags and the state-level instruments discussed above and using weighted system GMM. Specifically, to accommodate varying importance of the states in the sample, we use weights proportional to the number of banks in each state.

In Column (9), we instrument a BHC's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Area)*. This is calculated as the weighted average of the *R&S* Index of neighbor or adjoining states, where the weights correspond to a given adjoining state's land area. This instrument is based on the literature on state policy diffusion which finds that states tend to follow neighboring states in adopting new laws and policies to reduce political risk and stay competitive (e.g., Mooney, 2001; Shipan and Volden, 2008; Gillardi, 2010: Berger, El Ghoul, Guedhami, Saheruddin, 2017).[15] Similarly, in Column (10), we instrument a BHC's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Border)*. This is the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's border length area. Results continue to hold in all of these analyses.[16]

An additional concern is that bank entry and exit may be affected by deregulation and also influence bank capital structure decisions. Columns (11), (12), and (13) use surviving banks only, acquired banks

[14] We measure unit banking in 1979 because it precedes most deregulation. We expect more prominent small bank presence and slower deregulation in states where unit banking laws were previously in effect.

[15] We follow Berger and Sedunov (2017) to determine the adjoining states of Alaska and Hawaii. Alaska's adjoining states are Hawaii, Oregon, Washington, and California; the adjoining states for Hawaii are Alaska, Oregon, Washington, and California.

[16] When conducting instrumental variable tests, we opt for the most conservative approach and assume all right-hand-side variables are either endogenous or predetermined (and not strictly exogenous). Our results are stronger when we relax this assumption. We also test for overidentification restrictions, where the joint null hypothesis is that the instruments and the error term are uncorrelated. We find that the Hansen *J*-statistic of overidentification restrictions is insignificant, confirming the validity of the instruments.

only, and other banks (e.g., new and non-surviving banks), respectively, and our results continue to hold.

5.2.2 Sample Composition and Alternative Explanations

Table 3 Panel B presents tests of whether our findings are driven by potential biases in the sample in Columns (1) – (5) or alternative explanations in Columns (6) – (13).

Column (1) restricts our analysis to banks that do not relocate their state headquarters during the sample period to rule out a concern of bank relocation based on deregulation. Column (2) drops South Dakota and Delaware, states with very liberal banking rules. Column (3) excludes financial crisis observations (2007-2009) to ensure that our results are not driven by crisis times. Column (4) includes both public and private banks, while Column (5) includes private banks only. In both columns, we include all controls from our main specification, except for *Market-to-Book*, which cannot be constructed for private banks. Our results continue to hold in all of these analyses.

Column (6) employs lagged *Equity Ratio* in place of *Do-Nothing Capital*. Column (7) replaces *R&S Index* with the change in *R&S Index*. In Columns (8) and (9), we adopt an alternative difference-in-difference (DID) approach using a binary deregulation variable based on the first interstate branching deregulation event in the headquarters state of the bank (e.g. Cornaggia, Mao, Tian, and Wolfe, 2015). Specifically, in Column (8), we replace *R&S Index* with *RegCh1,* which equals 1 from first year a deregulation change occurs until second regulatory change in the state, while in Column (9), *RegCh2* remains at 1 until the end of the sample.[17] Both specifications include all controls from the main specification, in addition to bank, time, and state fixed effects. The coefficient estimates on *RegCh1* and *RegCh2* are positive and statistically significant, corroborating our main results.

Column (10) adds two controls for the banking environment, the *Fed Funds Rate* and the *TED Spread*. In Column (11), we introduce *Before (2, 1)*, a dummy equal to one in the two years prior to interstate branching deregulation in the state (Krishnan, Nandy, and Puri, 2014). This allows us to test whether our results reflect prior secular trends in bank capital structure.[18] The estimated coefficient on *Before (2, 1)* is not significant, alleviating concerns that our results are driven by prior trends in the capital ratios. Finally, some researchers argue that capital ratios are bounded between zero and one, which can lead to mechanical mean reversion and thereby bias the partial adjustment estimates (e.g., Shyam-Sunder and Myers, 1999; Chen and Zhao, 2007). In Column (12), we address this concern by eliminating banks with extreme capital ratios (greater than 90th or less than 10th percentiles). In all these checks, the effect of *R&S*

[17] Results using *KNP Index* are identical and thus not shown in Appendix, Table A1. Alternative definitions of the difference-in-difference term yield qualitatively and quantitatively similar results.

[18] This effectively tests the parallel trends assumption in difference-in-difference regressions (e.g., Roberts and Whited, 2012).

Index remains economically and statistically significant.

5.2.3 Falsification Tests

In Table 3 Panel C, we run placebo tests to address concerns that omitted shocks that occurred around the times of deregulation could be driving our results. Columns (1) – (10) artificially assume that deregulation occurred one through five years prior to or after actual occurrence (e.g., Roberts and Whited, 2012). Column (11) randomly assigns states to *R&S Index* values, maintaining the original distribution. Column (12) randomly assigns the states into each of the deregulation years with their corresponding index values. Insignificant coefficients on pseudo indices alleviate concerns about omitted shocks driving our results.

5.2.4 Cross-Sectional Evidence

In Table 3 Panel D columns (1)-(12), we re-estimate the model using subsamples of below- and above-median values of bank and market characteristics – bank size, return on assets (*ROA)*, *Market-to-Book* (*MTB*), *Income Diversification*, *Asset Diversification*, exposure to state economic conditions (*State Coincident Index*). In Panel D columns (13)-(24), we similarly conduct subsamples of below- and above-median values of geographic diversification proxied in several ways as in Goetz, Leaven, and Levine, (2013, 2016): *Diversification Dummy* (binary for banks operating in multiple state), *(1-HHI)* (one minus the Herfindahl-Hirschman Index of bank deposit shares across U.S. states, *Fraction of Out-of-State Depos*its, *Fraction of Out-of-State Branches*, *Ln(Average Distance HDQ to Subs)* or the natural logarithm of the average geographic distance between the bank's headquarters address to each of the state capitals where its subsidiaries are located, and *Active Acquirer* (indicator for banks that acquire other institutions during the sample period or not). Across all subsamples, the coefficients on *R&S Index* are negative and statistically significant in all cases, consistent with our main results.

5.2.5 Results using a Measure of Geographic Expansion (1-HHI) and a Gravity-Deregulation Approach

An alternative measure of geographic deregulation frequently used in the literature is the banks' deposit dispersion across states, one minus the Herfindahl-Hirschman index of bank deposit shares across U.S. states (*1-HHI*). It ranges from zero to one, with larger values suggesting a higher degree of BHC geographic expansion/diversification. In Table 3 Panel D columns (1), we rerun our results using *(1-HHI)* as our key independent measure instead of the *R&S Index*. The results suggest that geographic expansion is associated with higher bank target capital ratios.

To assess the causal impact of bank geographic deregulation, some of the recent literature on bank deregulation (Michalski and Ors, 2012; Goetz, Leaven, and Levine, 2013, 2016; Chu, Deng, and Xia, forthcoming) uses an IV approach based on a gravity-deregulation model. The gravity deregulation model has been widely used in the international trade literature to construct instruments for bilateral trade flows to assess the relation between international trade and various outcomes such as income (Frankel and Romer,

1999; Helpman, Melitz, and Rubinstein, 2008). This model uses determined factors such as country size and physical distance between different countries to project geographic expansion across state borders.

We follow this prior literature and integrate the staggered bank branching deregulation into the gravity model that includes the physical distance in miles between a bank's headquarters zip code and the zip code for the capital of a foreign state and the relative market size or relative GDP between the home and foreign states in order to project the deposit share a subsidiary may receive in each foreign state. A bank may be more likely to expand to a neighboring state because the geographical distance is lower than a more distant state, and thus also the cost of expansion is lower. In addition, a bank may be more attracted to larger or more economically prosper markets. Following the literature, we develop and use the following process for constructing the instrument for the bank geographic deregulation.

In the first step ("Stage 0"), we include all possible pairs of banks (b) and states (j) over our sample period of 1986-2014, and estimate the gravity model:

$$Share_{b,i,j,t} = \psi_0 + \psi_1 \cdot Distance_{b,i,j} + \psi_2 \cdot Ln\left(\frac{Population_{i,t}}{Population_{j,t}}\right) + \psi_3 \cdot Neighbor\ State_{i,j} + \psi_4 \cdot Home\ State_{i,t} + \psi_5 \cdot Early\ Deregulation\ Indices_{j,t} + \varepsilon_{b,i,j,t}. \quad (3)$$

where $Share_{b,i,j,t}$ is the percentage of bank b's deposits in state j in time period t and bank b is headquartered in state i; $Distance_{b,i,j}$ is the straight-line distance between a bank b's headquarters in the home state i and the capital of the foreign state j (in 100s of miles) based on zip addresses. The physical locations of the banks' headquarters were almost all determined well before the period of interstate bank branching deregulation; thus, distance can be considered a reasonably exogenous source of variation in how bank deregulation differentially affects banks in a state. We expect that the coefficient on the distance would be negative because banks are less likely to expand to distant states. $Ln\left(\frac{Population_{i,t}}{Population_{j,t}}\right)$ is the natural logarithm of the population of a bank's home state i divided by the population of the foreign state j, and proxies for the relative market size of the home versus the foreign states. For this, we expect that the coefficient would be negative because a bank headquartered in a smaller market may be more likely to expand geographically to a relatively larger foreign market. In an alternative specification, we replace the state population ratio with a state GDP ratio, another proxy for the market size and economy of each state. Following Frankel and Romer (1999) who find that a common border shared by two countries plays an important role in determining bilateral trade volume, we also include $Neighbor\ State_{i,j}$ dummy to account for the possibility that a bank is more likely to expand to a neighbor state that shares a common border with its home state. We also include $Home\ State_{i,t}$ dummy to account for the possibility that a bank may also

expand within its home state. Finally, different from the prior literature which mostly focuses on early bank deregulation, here we focus on bank branching deregulation and we extend the gravity model to control for intrastate and interstate early deregulation indices in all cases.

To incorporate the dynamic process of interstate banking deregulation, we only include observations in which it is legally feasible for bank *b* headquartered in state *i* to open subsidiaries in a "foreign" state *j* during quarter *t*. We provide estimates of equation (3) using both a fractional logit model as in Papke and Wooldridge (1996, 2008) and OLS. We first employ a fractional logistic model because (a) the dependent variable, the percentage of deposits a bank (*b*) has in a particular state *j* (*Share*), is bounded between zero and one and many observations have zero values as banks are not legally permitted to enter in other foreign states and the fractional logistic model ensures that the projected shares are bounded between zero and one. We also consider regression specifications that control for time fixed effects to control for time-specific influences, and state-pair fixed effects to control for time-invariant features of each state pair. In these cases, we use OLS instead of a fractional logit model to avoid incidental parameter problems when employing a large number of fixed effects in logistic models and convergence issues. Results for the "zero" stage are shown in Appendix A, Table A6, Panel A. Columns (1)-(2) show results using fractional logistic models, while columns (3)-(4) show results using the OLS models. As conjectured, looking at columns (1)-(2), the coefficient estimates on the geographic distance are negative and statistically significant, indicating that banks are more likely to increase their deposit shares or expand in states geographically close to them. Similarly, the estimates on the population and GDP ratios between home and expansion state are negative and statistically significant, suggesting that banks are more likely to expand to larger states. We also find positive and statistically significant coefficients for *Neighbor State* and *Home State*, so that banks are more likely to increase investments in neighboring states and their own state. OLS results in columns (3)-(4) are consistent with the fractional logit model.

We next calculate the predicted value of the bank's deposit shares in expansion states based on the gravity model estimated using fractional logistic model or OLS respectively. For observations in which regulation prohibits a bank from operating in a foreign state, we set the projected deposit share to zero. Then, we construct the time-varying bank-specific IV as one minus the Herfindahl index based on the projected deposit shares *(1-Predicted HHI)* and use this as the instrument for a bank's actual dispersion of deposits *(1-HHI)*.

Using this instrument, we use a 2SLS analysis to study the impact of geographic deregulation proxied by *(1-HHI)* on bank target capital and speed of adjustment. Importantly, in the 1st stage, the actual geographic deregulation (1-HHI) is regressed on *(1-Predicted HHI)*, while in the 2nd stage target capital and speed of adjustment are regressed on the predicted value of geographic deregulation from the first stage

*Predicted (1-HHI).*We report the 1st stage in Appendix A, Table A6, while we report the 2nd stage results in Table 3 Panel E columns (2)-(5). Across all these specifications, while controlling for endogeneity using the gravity deregulation instrument, we continue to find that geographic deregulation is associated with higher bank target capital ratios.

Finally, Panel E columns (6)-(10) show results using measures of bank geographic expansion other than *(1-HHI)*. These are *Diversification Dummy* (an indicator for banks operating in multiple state), *Fraction of Out-of-State Depos*its, *Fraction of Out-of-State Branches*, *Ln(Average Distance HDQ to Subs)*, *Active Acquirer* (indicator for banks that acquire other institutions during the sample period) and *Active Acquirer Out-of-State* (indicator for banks that acquire other institutions outside their home state during the sample period). These results also suggest higher bank target capital ratios, corroborating our earlier findings.

5.3 Deregulation and Target Capital: Potential Channels

We conduct two sets of tests to investigate the channels behind the main results. The first test uses interactions with all of the traditional target capital determinants from Equation (3). The second uses interactions with alternative proxies for each of the channels. We treat the channel characteristics as endogenous and employ all valid lags of these variables as instruments in the regressions. To be able to interpret the relative magnitudes, we demean and rescale the characteristics by their standard deviation.

5.3.1 Capital Structure Determinants as Proxies for the Channels

In Table 4 Panel A interacts *R&S Index* with various determinants of the capital ratio to shed light on potential channels behind the results.[19] We assign each determinant to one of the channels discussed above, with the caveat that these assignments are imperfect, given that some variables may be argued as reflecting multiple channels. Specifically, we consider *Market-to-Book, Retail Deposits, Business Loans*, and *Off-Balance-Sheet* as proxies for charter value (consistent with Keeley, 1990 and Berger, DeYoung, Flannery, Lee, and Öztekin, 2008), *ROA*, *StdvROA*, and *Cost Efficiency* as proxies for cost of capital, and *M&A* and *Ln(Assets)* as proxies for agency problems. We present results with each determinant interaction in Columns (1) – (9), and all the determinant interactions in Column (10).

The ***charter value channel*** appears to be important. The interactions of *R&S Index* with *Market-to-Book* in Columns (1) and (10) are negative and statistically significant. These suggest that banks exposed to more deregulation (i.e., lower *R&S Index*) target higher capital ratios when they have higher charter values. The findings for *Business Loans* and *Off-Balance-Sheet* are consistent. However, *Off-Balance-*

[19] While we include the uninteracted *R&S Index* term, this does not help with the investigation of the channels because it gives the effect when all of the variables that are interacted have value 0, which are not realistic values in many cases. For example, we do not want to evaluate the effect with 0 retail deposits.

Sheet loses its significance in Column (10). Another proxy for charter value, *Retail Deposits* have an inconsistent sign. We also find some support for the ***cost of capital channel***. The interactions of *R&S Index* with *ROA*, *StdvROA,* and *Cost Efficiency* are statistically significant and consistent with banks that are more profitable, safer, and more efficient having lower costs of internal and external capital and higher target capital ratios. But, the interactions with *StdvROA* and *Cost Efficiency* are not statistically significant in Column (10).

Finally, the interactions of *R&S Inde*x with *M&A* and *Ln(Assets)* lend support to shareholder-creditor ***agency problems channel***, consistent with banks with expanded growth opportunities mitigating their agency problems by targeting higher capital. However, we acknowledge that the interaction with *Ln(Assets)* is only significant in Column (9).

In terms of relative importance, the largest economic impact stems from the ***charter value channel***. In Column (10), banks in states that are most open to interstate branching choose a target capital ratio 1.9 ((0.0017/(1-0.6345)) × 4) and 2.0 ((0.0018/(1-0. 6345)) × 4) percentage points higher than banks in states with the most restrictions due to larger charter values as implied by one standard deviation increase in *Market-to-Book* and *Business Loans*. The corresponding magnitudes are 0.5 percentage points (*ROA*) with the ***cost of capital channel*** and 0.4 percentage points (*M&A*) with the ***agency problems channel***. To further pin down the corresponding effects, we next employ alternative proxies for the channels.

5.3.2 Alternative Proxies for the Channels

Table 4 Panel B uses alternative proxies for each of the channels. To proxy for the charter value, we include *Number of Branches* (number of branches per dollar of assets), *State Presence* (number of U.S. states in which a bank operates), and *Metropolitan Areas* (percentage of bank operations in metropolitan areas) and interact *R&S Index* with these variables. Presumably, banks that increase their network of branches, conquer more territory, and are positioned in more profitable metropolitan markets have higher charter values. Using all these proxies, we find that banks with higher charter values choose higher target capital ratios, consistent with the ***charter value channel***.[20]

To proxy for the cost of capital, we include *Cost of Funding*, *Expected Default Frequency,* and *Stock Beta. Cost of Funding* is total interest expenses over interest-bearing liabilities as in Levine, Lin, and Xie (2016). *Expected Default Frequency* is the normal transform of the distance-to-default measure (Merton, 1974) using bank-level daily stock return data from CRSP and financial data from the Y-9C

[20] Average bank increased its *Market-to-Book* after interstate branching deregulation, both in the panel and in the cross-section of banks holding the year constant, also corroborating the evidence on the ***charter value channel***.

report.[21] *Stock Beta* is computed from daily returns over a one-year horizon derived from the Fama and French (1993) 3-factor model, in which we regress each bank's stock returns on Market, HML, and SMB. All three measures reflect costs faced by banks in raising new capital. Only the interactions on *Cost of Funding* and *Expected Default Frequency* are statistically significant consistently and suggest that banks facing higher costs of funding tend to desire higher capital ratios, inconsistent with the ***cost of capital channel***.[22]

Finally, to proxy for agency problems, we use *Government Subsidy* and *Institutional Ownership. Government Subsidy* measures the value of the bank's government safety net protection from explicit and implicit government guarantees (Carbo-Valverde, Kane, and Rodriguez-Fernandez, 2012; Srivastav, Armitage, Hagendorff, and King, 2018).[23] A higher government subsidy can create moral hazard incentives to take on excessive risk, and thus indicates higher agency problems. *Institutional Ownership* is the ratio of institutional shareholdings to total outstanding shares. Higher institutional ownership ratio suggests more monitoring and less agency problems (e.g., Chen, Harford, and Li, 2007). The interactions on *Government Subsidy* are consistently significant and indicate that banks facing lower agency problems target higher capital ratios, which is not consistent with the ***agency problems channel***.

The channel analyses in Panels A and B suggest that the ***charter value channel*** is the most strongly supported explanation of **Hypothesis H1a: Higher Target Capital Ratio**. Consistent results are shown for *KNP Index* in Appendix, Table A2.

6. Empirical Results for the Effects of Geographic Deregulation on Bank Capital Adjustment Speed

We test **Hypothesis H2a: Faster Adjustment Speed** versus **H2b: Slower Adjustment Speed** about how banks' capital adjustment speeds are affected by geographic deregulation.

6.1 Deregulation and Capital Adjustment Speeds: Main Results

We analyze capital adjustment speeds using a pooled Ordinary Least Squares (OLS) regression of the form in Equation (8), with bootstrapped standard errors to account for the generated regressor (Pagan, 1984). We also control for a variety of bank capital speed determinants, as well as year fixed effects.

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[21] We model the market equity value of a bank as a call option on the bank's assets. Following Acharya, Anginer, and Warburton (2016), we use the market value of equity to proxy for the market value of the bank and total liabilities to proxy for the face value of debt. Further details are provided in Table 1.

[22] This is consistent with the findings of Berger, El Ghoul, Guedhami, and Roman (2018), who find that the cost of equity capital for banks increases after deregulation due to higher market and portfolio risk.

[23] Following prior research, we estimate the insurance price premium (*IPP*), a proxy for government safety net benefits, using the Merton's nonlinear model in which the fair insurance premium is stated as a percentage of a bank's debt (Merton, 1977). Table 1 includes further details.

Table 5 shows the main results. Columns (1) and (2) present results using *R&S Index* and *KNP Index*, respectively. The coefficients of both indices are negative and statistically significant at the 1% level, suggesting that geographic deregulation is associated with faster bank capital adjustment speeds. The speed of adjustment to the target for banks in the most open interstate branching regime (*R&S Index* = 0) is 9.4% faster (-0.0235 × 4) than banks in the most restricted regime (*R&S Index* = 4). Thus, an average bank in the most restricted interstate branching regime takes about 4.5 years to close half the gap between its actual and target capital, compared to 2.6 years in the most open interstate branching regime.[24]

In Columns (3) – (7), we decompose *R&S Index* and *KNP Index* into their individual components. All deregulation restriction terms except *Reciprocity* are negative and statistically significant at the 1% level, suggesting that deregulation from removal of several different interstate branching restrictions is associated with higher adjustment speeds.

These results are consistent with the empirical dominance of **Hypothesis H2a: Faster Adjustment Speed** over **H2b: Slower Adjustment Speed**.

6.2 Deregulation and Capital Adjustment Speeds: Robustness Checks

Table 6 provides robustness tests for the effects of geographic deregulation on bank capital adjustment speeds using *R&S Index*. Similar results using *KNP Index* are shown in Appendix, Table A3.

6.2.1 Asymmetry Based on Capitalization: Below and Above Target Capital

Adjustment speed may depend on whether the bank is below or above target capital. In Table 6 Panel A, Columns (1) and (2), we allow for such an asymmetric response. The positive impact of deregulation on the adjustment speed is more pronounced among banks with below-target capital (2.56% vs. 1.59%). Banks that are below their target may be under extra pressure from stakeholders to adjust faster.

6.2.2 Additional Robustness Tests

To dismiss alternative explanations, we conduct two placebo tests. The first test in Table 6 Panel B Column (1) randomly assigns states to *R&S Index* values maintaining the original empirical distribution. The second test in Column (2) randomly assigns the states into each of the deregulation years with their corresponding index values. The coefficient estimates of the placebo deregulation indices are statistically insignificant and not different from zero in all cases, suggesting that reverse causality does not drive the capital adjustment

[24] The duration of 4.5 years is calculated as ln(0.5)/ln(1 – 0.2368+0.09), where 0.2368 is the constant term in column 1 of Table 5, and 0.09 is the difference in the adjustment speed between the most open and most restricted regimes (0.0235, the coefficient estimate on the product of $\widehat{DEV}_{i,t}$ and *R&S Index*, multiplied by 4). This duration goes down to 2.6 years (ln(0.5)/ln(1 – 0.2368)) for an average bank that switches to the most open interstate branching regime.

speed results.[25]

We conduct the same robustness tests undertaken for capital targets above that are applicable for the adjustment speeds. In Table 6 Panel B columns (3), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Area)*, the weighted average of the *R&S* Index of neighbor or adjoining states, where the weights correspond to a given adjoining state's land area. Similarly, in Column (10), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Border)*, the weighted average of the *R&S* Index of neighbor or adjoining states, where the weights correspond to a given adjoining state's border length area. In different columns of Table 6 Panel C, we exclude banks with headquarters relocations; exclude South Dakota and Delaware; exclude financial crisis observations; include both public and private banks; include private banks only; replace *R&S Index* with alternatively the change in *R&S Index, RegCh1* and *RegCh2*; add additional controls for the federal funds rate and TED spread; add *Before (-2, -1)* to control for secular trends; and eliminate banks with capital ratio observations greater than 90th or less than 10th percentile. All of these tests leave our conclusions unchanged.

Finally, Table 6 Panel D reports results when controlling for additional pressures from bank stakeholders: regulators, shareholders, debtholders, and depositors. The pressures from regulators are captured either by the number of corrective actions or a binary variable for whether correction actions were taken against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC), along with Federal Reserve district fixed effects. The pressures from shareholders, debtholders, and depositors are captured by institutional ownership (the ratio of institutional shareholdings to bank shares outstanding), the ratio of subordinated debt to total assets, and the ratio of uninsured deposits to total deposits, respectively. Our results continue to hold in all of these tests.

6.2.3 Results using a Measure of Geographic Expansion (1-HHI) and a Gravity-Deregulation Approach

Similar to the target capital, we also try an alternative measure of geographic deregulation frequently used in the literature, the bank deposit dispersion across U.S. states. As a reminder, this is one minus the Herfindahl-Hirschman index of bank deposit shares across U.S. states (*1-HHI*), with larger values suggesting a higher degree of bank geographic expansion/diversification. In Table 6 Panel E columns (1), we rerun our results using *(1-HHI)* as our key independent measure instead of the *R&S Index*. The results suggest that geographic expansion is associated with faster capital speed of adjustment to the target. To assess the causal impact of bank geographic deregulation, we also report results when using an IV approach

[25] Placebo tests undertaken for the target capital structure which artificially assume that Riegle-Neal interstate bank branching deregulation occurs one to five years prior to or after the actual deregulation year are not appropriate for the adjustment speed, since partial adjustment to target implies that deregulation effects are spread out across years, depending on the size of the costs and the benefits of adjustment.

based on the gravity-deregulation model described in detail in Section 5.2.5, where one minus the Herfindahl index based on the projected deposit shares *(1-Predicted HHI)* is the instrument for a bank's actual dispersion of deposits *(1-HHI)*. We report the 2nd stage results in Table 6 Panel E columns (2)-(5). Across all specifications, when using the gravity deregulation instrument, we continue to find that geographic deregulation is associated with higher bank capital speed of adjustment to the target.

6.3 Deregulation and Capital Adjustment Speeds: Potential Channels

Similar to the channel analyses for target capital, we analyze potential channels behind the observed positive relationship between adjustment speed and geographic deregulation. Our analysis uses interactions with the adjustment speed determinants from Equation (8). We assign each determinant to one of the channels discussed earlier. Specifically, we consider interactions with *Undercapitalized* and bond ratings (*Junk, BBB, Missing Rating*) for regulatory and market discipline, respectively. Regulators impose implicit costs on banks that are undercapitalized. Market participants impose explicit costs in the form of higher interest rates on debt on banks that have less favorable debt ratings. We include interactions with *GDP Growth* and *Inflation* as for banks' sensitivity to economic conditions, which reflect investment opportunities and costs of raising capital.

Table 7 shows interactions of *R&S Index* with the individual adjustment speed determinants in Columns (1) – (6) and includes all the determinant interactions in Column (7). The data do not support the ***regulatory and market discipline channel***, given that the interaction coefficients on *Undercapitalized* and bond ratings are not statistically significant. However, the data do support the ***sensitivity to economic conditions channel***. The interaction coefficients on *GDP Growth* and *Inflation* are negative and statistically significant, suggesting that banks exposed to more deregulation (i.e., lower *R&S Index*) adjust faster to their target capital ratios when facing more favorable economic conditions. Thus, the channels analysis suggests that the ***sensitivity to economic conditions channel*** helps explain **Hypothesis H2a: Faster Adjustment Speed**. We show consistent results using *KNP Index* in Appendix, Table A4.

7. Empirical Results for the Effects of Deregulation on Bank Capital Adjustment Methods

We next test **Hypotheses H3a**, **H3b**, and **H3c** regarding the extent to which banks employ active capital management, passive capital adjustment, and active asset management to adjust their capital ratios in response to geographic deregulation. We assess the impact of the interstate branching deregulation on the annual growth rates from *t-1* to *t* in bank equity and assets.

We perform a multivariate regression analysis that takes into account the simultaneous nature of the balance sheet components and time trends that could affect all banks in similar ways. Specifically, we obtain estimates from a system of structural equations via three-stage least squares (3SLS) where the

dependent variables consist of growth rates in the balance sheet components (Zellner and Theil, 1962). The exogenous variables are treated as instruments for the endogenous variables and consist of bank controls, a time trend and year fixed effects. In fitting the data, we allow residuals to be correlated across the equations.

Table 8 presents the results. Our main independent variable is *Post Branching Deregulation*, a dummy equal to one after the first interstate branching deregulation change in each bank's headquarters state.[26] The dependent variables are the annual growth rates from *t-1* to *t* in bank equity and assets and their various components. Columns (1) – (3) focus on changes in the numerator of the capital ratio, *Equity*, to distinguish between internal (changes in retained earnings) and external (net issuances of shares, repurchases, and dividends) sources of capital. Columns (4) – (8) focus on changes in the denominator of the capital ratio, *Assets*, and show changes in its components.

Panel A documents the results for all sample banks. The results suggest that branching deregulation is associated with significant increases in external capital, but not internal capital. These findings support the empirical dominance of **Hypothesis H3a: Active Capital Management** over **H3b: Passive Capital Management**. We also find that bank assets increased considerably more after branching deregulation, and much of this is due non-earnings assets like cash, while other earning assets such as securities and fixed assets sharply decreased. The growth in non-earning assets likely reflect banks' desires to exploit growth opportunities rather than active asset management to increase capital ratios. However, the decreased growth of other earnings assets such as securities and fixed assets could reflect active asset management to bolster capital ratios. Thus, **Hypothesis H3c: Active Asset Management** could also be relevant for our results.

Panel B documents the adjustments made by banks with above-target capital. As expected, these banks decrease their total equity. Both external and internal capital decrease, although the difference between periods is not significant for either, suggesting that these banks do not seem to achieve leveraging by a significant reduction in their capital base. Thus, neither **Hypothesis H3a**: **Active Capital Management** or **H3b**: **Passive Capital Management** are applicable for these banks. The asset growth for banks with above-target capital increases significantly more after deregulation, and the asset expansion is primarily attained by loans and other earning assets. This suggests that these banks achieve leveraging via managing their assets and not a reduction in the capital base, so **Hypothesis H3c**: **Active Asset Management** is likely the most relevant for them.

Panel C reports the adjustments made by banks with below-target capital. Not surprisingly, these

[26] Results are robust to using alternative definitions of the pre- and post-branching deregulation periods, such as weighting based upon the location of the deposits in each state in which the bank operates. In unreported tests, we obtain similar conclusions from univariate tests.

banks increase their total equity. Furthermore, the results support **Hypothesis H3a: Active Capital Management** over **H3b: Passive Capital Management**, given that only external capital increases are significant for these banks. Asset growth for banks with below-target capital increases significantly more after deregulation, and the asset expansion is primarily attained by non-earning assets (hoarding cash). Most of the increase in the capital ratio by the banks with below-target capital is realized by recapitalizing rather than downsizing the bank. However, the decreased growth of other earnings assets such as securities and fixed assets could reflect some active asset management to bolster capital ratios. Thus, **Hypothesis H3c: Active Asset Management** could also be relevant for these banks.

Thus, banks with above- and below-target capital use very different capital strategies after deregulation. Those with above-target capital achieve leveraging primarily through managing their assets (**Active Asset Management**), without any major contraction in the equity base after deregulation. In contrast, banks with below-target capital delever primarily via raising more external capital after deregulation (**Active Capital Management)** and contracting components of their asset base other than loans and non-earning assets (**Active Asset Management**). The results also suggest that the **Passive Capital Management** is generally more important before deregulation than after deregulation, whereas **Active Capital Management** and **Active Asset Management** are more important after deregulation.

8. Conclusions

This paper contributes to our understanding of how bank geographic deregulation influences banks' capital decisions. We examine for the first time the impact of changes in interstate bank branching deregulation on both bank target capital ratios and the adjustment speeds towards these targets. We also investigate methods of capital adjustment and a number of potential channels underlying the results.

We use partial-adjustment methodology in which bank target capital ratios and the speed at which banks converge to these targets are modeled as functions of geographic deregulation. We find robust evidence that bank geographic deregulation causes significant increases in bank target capital ratios, and leads to faster adjustments towards the banks' target capital ratios. Investigation of the channels behind the results suggests that the *charter value channel* is the most important factor in explaining target capital results, while the *sensitivity to economic conditions channel* best helps explain the speed of adjustment results. Findings are robust to employing alternative deregulation and capital proxies, state-level controls, instrumental variables, different empirical specifications, difference-in-difference estimation, falsification tests, and various subsamples.

We also examine the strategies that banks use to adjust their capital ratios in response to geographic deregulation by assessing the impact of interstate branching deregulation on changes in equity and asset

growth. We find that banks adjust their capital ratios more using active capital market operations than passively through retained earnings. Results are also somewhat consistent with actively changing assets to affect capital ratios. When we analyze capital strategies employed by banks with above- and below-target capital after deregulation, we observe very different results. Above-target capital banks primarily use active asset management, and below-target capital institutions use both active capital management and active asset management.

Our results add to six different strands of literature: literature on U.S. bank geographic deregulation, bank capital structure, firm capital structure, as well as the three strands covering mechanisms of geographic deregulation and capital – competition and capital, geographic expansion/diversification and capital, bank size and capital. We also extend the literature on regulation and financial stability by focusing on geographic regulation, rather than prudential regulation.

Our findings contribute to longstanding policy debates on bank capital and financial stability. Since the financial crisis, policymakers around the world have adopted an array of prudential regulations, including more stringent capital rules under Basel III. However, none of the post-crisis regulations explicitly consider the effects of bank deregulation on capital structure. Our paper is the first to suggest that bank deregulation may have beneficial effects on bank capital structure, motivating banks to hold more capital, speed up their capital adjustments, and employ more active capital management. Thus, deregulation may be able to supplement prudential capital policies and result in greater financial stability.

References

Acharya, V., Anginer, D., Warburton, A., 2016. The end of market discipline? Investor expectations of implicit state guarantees. Working Paper. New York University Stern School of Business.

Acharya, V., Hasan, I., Saunders, A., 2006. Should banks be diversified? Evidence from individual bank loan portfolios. *Journal of Business* 79, 1355 – 1411.

Acharya, V.V., Mehran, H., Thakor, A.V., 2016. Caught between Scylla and Charybdis? Regulating bank leverage when there is rent seeking and risk shifting. *Review of Corporate Finance Studies* 5, 36–75.

Admati, A.R., DeMarzo, P.M., Hellwig M.F., Pfleiderer, P.C., 2013. Fallacies, irrelevant facts, and myths in the discussion of capital regulation: Why bank equity is not expensive. Working Paper. Stanford University and Max Planck Institute.

Akhigbe, A., Whyte, A. M., 2003. Changes in market assessment of bank risk following the Riegle-Neal Act of 1994. *Journal of Banking and Finance* 27, 87–102.

Allen, F., Carletti, E., Marquez, R.S., 2011. Competition and capital regulation. *Review of Financial Studies* 24, 983–1018.

Amore, M.D., Schneider, C., Zaldokas, A. 2013. Credit supply and corporate innovation. *Journal of Financial Economics* 109, 835–855.

Andersen, L., Burger, A., 1969. Asset management and commercial bank portfolio behavior: Theory and practice. *The Journal of Finance 24*, 206–221.

Ashcraft, A.B., 2008. Does the market discipline banks? New evidence from the regulatory capital mix. *Journal of Financial Intermediation* 17, 787–821.

Ayuso, J., Perez, D., Saurina, J., 2004. Are capital buffers pro–cyclical? Evidence from Spanish panel data. *Journal of Financial Intermediation* 13, 249–264.

Bain, J. 1956. Barriers to New Competition. Cambridge, Mass.: Harvard University Press.

Baker, M., Wurgler, J., 2002. Market timing and capital structure. *Journal of Finance* 57, 1–32.

Baron, M., 2017. Countercyclical bank equity issuance. Working Paper. Princeton University.

Becher, D.A., Campbell, T.L., Frye, M.B., 2005. Incentive compensation for bank directors: The impact of deregulation. *Journal of Business* 78, 1753–1777.

Becher, D. A., Frye, M. B., 2011. Does regulation substitute or complement governance?. *Journal of Banking and Finance* 35, 736–751.

and stability: Cross-country heterogeneity. *Journal of Financial Intermediation* 22, 218–244.

Beck, T., Levine, R., Levkov, A. 2010. Big bad banks? The winners and losers from bank deregulation in the United States. *Journal of Finance* 65, 1637–1667.

Berger, A.N., 1995. The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking* 27, 432–56.

Berger, A.N., Bouwman, C.H., 2013. How does capital affect bank performance during financial crises? *Journal of Financial Economics* 109, 146–176.

Berger, A.N., Chen, R., El Ghoul, S., Guedhami, O. 2018. Who wins and loses from bank geographic deregulation? Analysis of financially constrained and unconstrained firms. Working Paper.

Berger, A.N., DeYoung, R., Flannery, M., Lee, D., Öztekin, Ö., 2008. How do large banking organizations manage their capital ratios? *Journal of Financial Services Research* 34, 123–149.

Berger, A.N., El Ghoul, S., Guedhami, O., Roman, R.A., 2016. Internationalization and bank risk. *Management Science* 63, 2283–2301.

Berger, A.N., El Ghoul, S., Guedhami, O., Saheruddin, H., Competition Does Not Kill Banks, It Makes Them Stronger: The Impact of Geographic Deregulation on Bank Risk. Working Paper.

Berger, A.N., El Ghoul, S., Guedhami, O., Roman, R. A, 2018. Competition and banks' cost of capital.

Working Paper.

Berger, A.N., Hannan, T. H., 1998. The efficiency cost of market power in the banking industry: A test of the `quiet life' and related hypotheses. *Review of Economics and Statistics* 80, 454–465.

Berger, A.N., Kashyap, A.K., Scalise, J.M., 1995. The transformation of the U.S. banking industry: What a long, strange trip it's been. *Brookings Papers on Economic Activity* 1995, 55–218.

Berger, A.N., Klapper, L.F., Turk-Ariss, R., 2009. Bank competition and financial stability. *Journal of Financial Services Research* 35, 99–118.

Berger, A.N., Mester, L.J., 1997. Inside the black box: What explains differences in the efficiencies of financial institutions? *Journal of Banking and Finance* 21, 895–947.

Berger, A.N. and Sedunov, J., 2017. Bank liquidity creation and real economic output. *Journal of Banking and Finance 81*, 1-19.

Berger, P. G., Ofek, E., 1996. Bustup takeovers of value destroying diversified firms. *Journal of Finance* 51, 1175–1200.

Bernanke, B.S., 2009. Lessons of the Financial Crisis for Banking Supervision. Speech at the At the Federal Reserve Bank of Chicago Conference on Bank Structure and Competition, Chicago, Illinois, May 07, 2009. Available online at https://www.federalreserve.gov/newsevents/speech/bernanke20090507a.htm.

Bhattacharya, S., A. Boot, Thakor, A. V., 1998. The economics of banking regulation. *Journal of Money, Credit and Banking* 30, 745–70.

BIS, 2017. 87th Annual Report. June 2017. Available online at: https://www.bis.org/publ/arpdf/ar2017e.pdf.

Black, S.E., Strahan, P.E., 2002. Entrepreneurship and bank credit availability. *Journal of Finance* 57, 2807–2833.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87, 115–143.

Boyd, J. H., Prescott, E. C., 1986. Financial intermediary-coalitions. *Journal of Economic Theory* 38, 211–232.

Brewer, E., Kaufman, G., Wall, L., 2008. Bank capital ratios across countries: Why do they vary? *Journal of Financial Services Research* 34, 177–201.

Calem, P.S., Rob, R., 1999. The impact of capital-based regulation on bank risk-taking. *Journal of Financial Intermediation* 8, 317–352.

Calomiris, C., 2000. U.S. Bank deregulation in historical perspective. Cambridge University Press, New York.

Calomiris, C.W., Herring, R.J., 2013. How to design a contingent convertible debt requirement that helps solve our too-big-to-fail problem. *Journal of Applied Corporate Finance* 25, 39–62.

Calomiris, C. W., Kahn, C. M., 1991. The role of demandable debt in structuring optimal banking arrangements. *American Economic Review* 81, 497–513.

Calomiris, C., Wilson, B., 2004. Bank capital and portfolio management: The 1930's "capital crunch" and the scramble to shed risk. *Journal of Business* 77, 421–455.

Campbell, T., Kracaw, W., 1980. Information production, market signaling, and the theory of financial intermediation. *Journal of Finance* 35, 863–81.

Carbo-Valverde, S., Kane, E. J., Rodriguez-Fernandez, F., 2012. Regulatory arbitrage in cross-border

Célérier, C., Matray, A., 2016. Unbanked households: Evidence of supply-side factors. HEC Paris Research Paper No. FIN-2014-1039.

Cetorelli, N., Strahan, P.E., 2006. Finance as a barrier to entry: Bank competition and industry structure in local U.S. markets. *Journal of Finance* 61, 437–461.

Chang, X., Dasgupta, S., 2009. Target behavior and financing: How conclusive is the evidence? *Journal of Finance* 64, 1767–1796.

Chava, S., Oettl, A., Subramanian, A., Subramanian, K.V., 2013. Banking deregulation and innovation. *Journal of Financial Economics* 109, 759–774.

Chen, L., Zhao, X., 2007. Mechanical mean reversion of leverage ratios. *Economics Letters* 95, 223–229.

Chen, X., Harford, J., Li, K., 2007. Monitoring: which institutions matter? *Journal of Financial Economics* 86, 279–305.

Chong, B.S., 1991. The effects of interstate banking on commercial banks' risk and profitability. *Review of Economics and Statistics*, 78–84.

Chu, Y., Deng, S., Xia, C., Forthcoming. Bank Geographic Diversification and Systemic Risk. *Review of Financial Studies*.

Cook, D., Tang, T., 2010. Macroeconomic conditions and capital structure adjustment speed. *Journal of Corporate Finance* 16, 73–87.

Cornaggia, J., Mao, Y., Tian, X., Wolfe, B., 2015. Does banking competition affect innovation? *Journal of Financial Economics* 115, 189–209.

DeAngelo, H., Roll, R., 2015. How stable are corporate capital structures? *Journal of Finance* 70, 373–418.

DeAngelo, H., DeAngelo, L., Whited T. M., 2011. Capital structure dynamics and transitory debt. *Journal of Financial Economics* 99, 235–261.

De Jonghe, O., Öztekin, Ö., 2015. Bank capital management: International evidence. *Journal of Financial Intermediation* 24, 154–177.

Demsetz, R.S., Saidenberg, M.R., Strahan, P.E., 1996. Banks with something to lose: The disciplinary role of franchise value. *Economic Policy Review*, 2(2).

Demsetz, R. S., Strahan, P. E., 1997. Diversification, size, and risk at bank holding companies. *Journal of Money, Credit, and Banking* 29, 300 – 313.

Demyanyk, Y., 2008. U.S. banking deregulation and self-employment: A differential impact on those in need. *Journal of Economics and Business* 60, 165–178.

Deng, S., Elyasiani, E., 2008. Geographic diversification, bank holding company value, and risk. *Journal of Money, Credit and Banking* 40, 1217 – 1238.

Denis, D. J., Denis D. K., Sarin, A., 1997. Agency problems, equity ownership, and corporate diversification. *Journal of Finance* 52, 135 – 160.

DeYoung, R., Li, L., 2018. Publicly traded versus privately held commercial banks: Capital access, growth and financial performance. Working Paper.

Diamond, D. W., 1984. Financial intermediation and delegated monitoring. *Review of Economic Studies* 51, 393 – 414.

Diamond, D., Rajan, R., 2000. A theory of bank capital. *Journal of Finance* 55, 2431–2465.

Dick, A. A., 2006. Nationwide branching and its impact on market structure, quality and bank performance. *Journal of Business* 79, 567–592.

Dick, A. A., Lehnert, A., 2010. Personal bankruptcy and competition. *Journal of Finance* 65, 655–686.

Drobetz, W., Wanzenried, G., 2006. What determines the speed of adjustment to the target capital structure? *Applied Financial Economics* 16, 941–961.

Erel, I., Julio, B., Kim, W., Weisbach, M.S., 2011. Macroeconomic conditions and capital raising. *The Review of Financial Studies* 25(2), 341–376.

Fama, E., French, K., 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, 3–57.

Faulkender, M., Flannery, M.J., Hankins, K.W., Smith, J.M., 2012. Cash flows and leverage adjustments. *Journal of Financial Economics* 103, 632–646.

Flannery, M.J., 1994. Debt maturity and the deadweight cost of leverage: Optimally financing banking firms. *American Economic Review* 84, 320–331.

Flannery, M.J., Hankins, K.W., 2013. Estimating dynamic panel models in corporate finance. *Journal of Corporate Finance* 19, 1–19.

Flannery, M.J., Rangan, K., 2006. Partial adjustment toward target capital structures. *Journal of Financial Economics* 79, 469–506.

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

Flannery, M.J., Sorescu, S., 1996. Evidence of bank market discipline on subordinated debenture yields 1983–1991. *Journal of Finance* 51, 1347–1377.

Frank, M.Z., Goyal, V.K., 2003. Testing the pecking order theory of capital structure. *Journal of Financial Economics* 67, 217–248.

Frank, M.Z., Goyal, V.K., 2009. Capital structure decisions: Which factors are reliably important? *Financial Management* 38, 1–37.

Frankel, J.A., Romer, D.H., 1999. Does trade cause growth?. *American Economic Review* 89, 379-399.

Galloway, T. M., W. B. Lee, D. M. Roden., 1997. Banks' changing incentives and opportunities for risk taking. *Journal of Banking and Finance* 21, 509–527.

Gillardi, F., 2010. Who Learns from What in Policy Diffusion Processes? *American Journal of Political Science* 54, 650-666.

Gilson, S. C., 1997. Transactions costs and capital structure choice: Evidence from financially distressed firms. *Journal of Finance* 52, 161–196.

Graham, J., Leary M., 2011. A review of empirical capital structure research and directions for the future. *Annual Review of Financial Economics* 3, 309–345.

Greenspan, A., 1998. The role of capital in optimal banking supervision and regulation. In Federal Reserve Bank of New York, "Financial services at the crossroads: Capital regulation in the twenty-first century, Proceedings of a conference," *FRBNY Economic Policy Review* 4, no. 3.

Goetz, M. R., L. Laeven, Levine, R., 2013. Identifying the valuation effects and agency costs of corporate diversification: Evidence from the geographic diversification of US banks. *Review of Financial Studies* 2, 1787-1832.

Goetz, M. R., Laeven, L., Levine, R., 2016. Does the geographic expansion of banks reduce risk? *Journal of Financial Economics* 120, 346–362.

Gropp, R., Heider, F., 2011. The determinants of bank capital structure. *Review of Finance* 15, 29–74.

Hackbarth, D., J. Miao, and E. Morrellec, 2006, Capital structure, credit risk and macroeconomic conditions. *Journal of Financial Economics* 82, 519–550.

Harris, M., Raviv, A., 1991. The theory of capital structure. *Journal of Finance* 46, 297–355.

Hart, O., Zingales, L., 2011. A new capital regulation for large financial institutions. *American Law and Economics Review* 13, 453–490.

Hellman, T., Murdock, K., Stiglitz J., 2000. Liberalization, moral hazard in banking, and prudential regularion: Are capital requirements enough? *American Economic Review* 90, 147–165.

Helpman, E., Melitz, M., Rubinstein, Y., 2008. Estimating trade flows: Trading partners and trading volumes. *The Quarterly Journal of Economics* 123, 441-487.

Hennessy, C., Whited, T., 2005. Debt dynamics. *Journal of Finance* 55, 1129–1165.

Hennessy, C., Whited, T., 2007. How costly is external financing? Evidence from a structural estimation. *The Journal of Finance 62*, 1705–1745.

Hillegeist, S., Keating, E., Cram, D., Lundstedt, K., 2004. Assessing the probability of bankruptcy. *Review of Accounting Studies* 9, 5–34.

Hortlund, P., 2005. The long-term relationship between capital and earnings in banking. SSE/EFI Working Paper Series in Economics and Finance No. 611.

Houston, J.F., James, C., 1995. CEO compensation and bank risk: is compensation in banking structured to promote risk taking? *Journal of Monetary Economics* 36, 405–431.

Hovakimian, A., Li, G., 2011. In search of conclusive evidence: How to test for adjustment to target capital structure. *Journal of Corporate Finance* 17, 33–44.

Hovakimian, A., Li, G., 2012. Is the partial adjustment model a useful tool for capital structure research? *Review of Finance* 16, 733-754.

Huang, R.R., 2008. Evaluating the real effect of bank branching deregulation: Comparing contiguous counties across U. S. state borders. *Journal of Financial Economics* 87, 678–705.

Huang, R., Ritter, J., 2009. Testing theories of capital structure and estimating the speed of adjustment. *Journal of Financial and Quantitative Analysis* 44, 237–271.

Hughes, J. P., Mester, L.J., 2013. Who said large banks don't experience scale economies? Evidence from a risk-return-driven cost function. *Journal of Financial Intermediation* 22, 559–585.

Iliev, P., Welch, I., 2015. Reconciling estimates of the speed of adjustment of leverage ratios. Working Paper. The Pennsylvania State University.

IMF, 2017. Global Financial Stability Report. Getting the Policy Mix Right. April 2017. Available online at: https://www.imf.org/en/Publications/GFSR/Issues/2017/03/30/global-financial-stability-report-april-2017.

Jayaratne, J., Strahan, P.E., 1996. The finance-growth nexus: Evidence from bank branch deregulation. *Quarterly Journal of Economics* 111, 639–670.

Jayaratne, J. and Strahan, P., 1997. The Benefits of Bank Branch Deregulation. *New York Federal Reserve Economic Policy Review 3.*

Jayaratne, J., Strahan, P.E., 1998. Entry restrictions, industry evolution, and dynamic efficiency: Evidence from commercial banking. *Journal of Law and Economics* 41, 239–274.

Jensen, M.C., 1986. Agency cost of free cash flow, corporate finance, and takeovers. Corporate Finance, and Takeovers. *American Economic Review* 76, 323–329.

Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3, 305–360.

Jensen, M. C., Murphy, K. J., 1990. Performance pay and top management incentives. *Journal of Political Economy* 98, 225–264.

Jiang, L., Levine, R., Lin, C., 2017. Does competition affect bank risk? (No. w23080). National Bureau of Economic Research.

Kashyap, A.K., Rajan, R.G., Stein, J.C., 2008. Rethinking capital regulation. In: Federal Reserve Bank of Kansas City symposium on maintaining stability in a changing financial system, Federal Reserve Bank of Kansas City, Kansas City, 431–471.

Keeley, M., 1990. Deposit insurance, risk and market power in banking. *American Economic Review* 80, 1183– 1200.

Kerr, W., Nanda, R., 2009. Democratizing entry: Banking deregulations, financing constraints, and entrepreneurship. *Journal of Financial Economics* 94, 124–149.

Koehn, M., Santomero, A.M., 1980. Regulation of bank capital and portfolio risk. *Journal of Finance* 35, 1235–1250.

Kole, S., Lehn, K., 1999. Deregulation and the adaptation of governance structure: the case of the US airline industry. *Journal of Financial Economics* 52, 79–117.

Kozak, S., Sosyura, D., 2015. Access to credit and stock market participation. Working Paper.

Krishnan, K., Nandy, D., Puri, M., 2014. Does financing spur small business productivity? Evidence from a natural experiment. *Review of Financial Studies* 28, 1768–1809.

Kraus, A., Litzenberger, R.H., 1973. A state-preference model of optimal financial leverage. *Journal of Finance* 28, 911–922.

Kroszner, R.S., Strahan, P.E., 1999. What drives deregulation? Economics and politics of the relaxation of bank branching restrictions. *Quarterly Journal of Economics* 114, 1437–1467.

Kroszner, R.S., Strahan, P.E., 2013. Regulation and deregulation of the US banking industry: Causes, consequences and implications for the future, in economic regulation and its reform: What have we learned? Rose, N.L., Ed., University of Chicago Press, Chicago, 485–543.

Kwan, S. H., Laderman, E., 1999. On the portfolio effects of financial convergence: A review of the literature, *Economic Review*, *Federal Reserve Bank of San Francisco* 2, 18–31.

Laeven, L., Levine, R., 2007. Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* 85, 331–367.

Leary, M. T. and Roberts, M. R., 2005. Do firms rebalance their capital structures? *Journal of Finance* 60, 2575–2619.

Leland, H., Pyle, D., 1977. Informational asymmetries, financial structure, and financial intermediation. *Journal of Finance* 32, 371–87.

Lemmon, M., Roberts, M., Zender, J., 2008. Back to the beginning: Persistence and the cross-section of corporate capital structure. *Journal of Finance* 63, 1575–1608.

Lepetit, L., Saghi-Zedek, N., Tarazi, A., 2015. Excess control rights, bank capital structure adjustments, and lending. *Journal of Financial Economics* 115, 574–591.

Levine, R., Levkov, A., Rubinstein, Y., 2008. Racial discrimination and competition. Working Paper No. w14273. National Bureau of Economic Research.

Levine, R., Lin, C., Xie, W., 2016. Geographic diversification and banks' funding costs. Working Paper.

Liao, L.-K., Mukherjee, T., Wang, W., 2015. Corporate governance and capital structure dynamics: An empirical study. *Journal of Financial Research* 38, 169–192.

Lin, L., Flannery, M., 2013. Do personal taxes affect capital structure? Evidence from the 2003 tax cut. *Journal of Financial Economics* 109, 549–565.

Lindquist, K.-G., 2004. Banks' buffer capital: How important is risk. *Journal of International Money and Finance* 23, 493–513.

Marcus, A., 1983. The bank capital decision: A time series-cross section analysis. *Journal of Finance* 38, 1217–1232.

Marcus, A.J., 1984. Deregulation and bank financial policy. *Journal of Banking and Finance*, 8, 557–565.

Martinez Peria, M., Schmuckler, S., 2001. Do depositors punish banks for bad behavior? Market discipline, deposit insurance and banking crises. *Journal of Finance* 56, 1029–1051.

Merton, R., 1974. On the pricing of corporate debt: The risk structure of interest rates. *Journal of Finance* 29, 449–470.

Merton, R., 1977. An analytic derivation of the cost of deposit insurance and loan guarantees. *Journal of Banking and Finance* 1, 3–11.

Mester, L. J., Hughes, J.P., Lang, W., Moon, C.G., 1999. The dollars and sense of bank consolidation. *Journal of Banking and Finance* 23, 291–324.

Michalski, T., Ors, E., 2012. (Interstate) Banking and (interstate) trade: Does real integration follow financial integration?. *Journal of Financial Economics* 104, 89-117.

Mooney, C. Z., 2001. Modeling Regional Effects on State Policy Diffusion. *Political Research Quarterly*

54, 103-124.

Morellec, E., Nikolov, B., Schürhoff, N., 2012. Corporate governance and capital structure dynamics. *Journal of Finance* 67, 803–48.

Morgan, D., Rime, B., Strahan, P.E., 2004. Bank integration and state business cycles. *Quarterly Journal of Economics* 119, 1555–1585.

Morgan, D., Stiroh, K., 2001. Market discipline of banks: The asset test. *Journal of Financial Services Research* 20, 195–208.

Myers, S.C., 1977. Determinants of corporate borrowing. *Journal of Financial Economics* 5, 147–175.

Myers, S.C., 1984. The capital structure puzzle. *Journal of Finance* 39, 574–592.

Myers, S.C., Majluf, N.S., 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13, 187–221.

Ovtchinnikov, A.V., 2010. Capital structure decisions: Evidence from deregulated industries. *Journal of Financial Economics* 95, 249–274.

Öztekin, Ö., Flannery, M.J., 2012. Institutional determinants of capital structure adjustment speeds. *Journal of Financial Economics* 103, 88–112.

Pagan, A., 1984. Econometric issues in the analysis of regressions with generated regressors. *International Economic Review* 25, 221–247.

Panzar, J.C., Rosse, J.N., 1987. Testing for" monopoly" equilibrium. *The Journal of Industrial Economics*, 443-456.

Papke, L. E., Wooldridge, J. M., 1996. Econometric methods for fractional response variables with an application to 401 (k) plan participation rates. *Journal of Applied Econometrics* 11, 619-632.

Papke, L. E., Wooldridge, J. M., 2008. Panel data methods for fractional response variables with an application to test pass rates. *Journal of Econometrics* 145, 121-133.

Rice, T., Strahan, P.E., 2010. Does competition affect small-firm finance? *Journal of Finance* 65, 861–889.

Roberts, M., Whited, T., 2012. Endogeneity in empirical corporate finance, in George Constantinides, Milton Harris, and Rene Stulz, eds. Amsterdam: Elsevier. *Handbook of the Economics of Finance* 2, 493–572.

Schaeck, K., Cihák, M., 2012. Banking competition and capital ratios. *European Financial Management* 18, 836–866.

Servaes, H., 1996. The value of diversification during the conglomerate M&A wave. *Journal of Finance* 51, 1201–1225.

Shipan, C. R., Volden, C., 2008. The Mechanism of Policy Diffusion. *American Journal of Political Science* 52, 840-857.

Shyam-Sunder, L., Myers, S.C., 1999. Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics* 51, 219–244.

Srivastav, A., Armitage, S. and Hagendorff, J.,King, T., 2018. Better Safe than Sorry? CEO Inside Debt and Risk-Taking in Bank Acquisitions. *Journal of Financial Stability*.

Stiroh, K.J., Strahan, P.E. 2003. Competitive dynamics of deregulation: Evidence from U.S. banking. *Journal of Money, Credit, and Banking* 35, 801–828.

Strebulaev, I. A., 2007. Do tests of capital structure theory mean what they say? *Journal of Finance* 62, 1747–87.

Stulz, R. M., 1990. Managerial discretion and optimal financing policies. *Journal of Financial Economics* 26, 3–27.

Tewari, I., 2014. The distributive impacts of financial development: Evidence from mortgage markets during US bank branch deregulation. *Applied Economics* 6, 175–196.

Thakor, A. V., 2014. Bank capital and financial stability: An economic tradeoff or a Faustian bargain? *Annual Review of Financial Economics* 6, 185–223.

Windmeijer, F., 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* 126, 25–51.

Zarutskie, R., 2006. Evidence on the effects of bank competition on firm borrowing and investment. *Journal of Financial Economics* 81, 503–537.

Zellner, A., Theil, H., 1962. Three stage least squares: Simultaneous estimate of simultaneous equations. *Econometrica* 29, 54–78.

Zwiebel, J., 1996. Dynamic capital structure under managerial entrenchment. *The American Economic Review* 86, 1197–1215.

Table 1. Variable Definitions and Summary Statistics

This table provides definitions, sources, and summary statistics for all variables used in our analysis for the period 1986-2014. All variables using dollar amounts are expressed in real 2014 dollars using the implicit GDP price deflator. We report means, medians, standard deviations, min, and max on all the regression variables used to examine the relationship between geographic deregulation and bank capital structure.

Variables	Definition and Source	Mean	Median	Stdv	Min	Max
Panel A. Capital Variables						
Equity Ratio	Ratio of equity capital to total (unweighted) assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.089	0.086	0.022	0.049	0.139
Do-Nothing Capital	(Lagged equity capital + net income - lagged dividends)/total assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.086	0.083	0.023	0.046	0.138
Panel B. Deregulation Variables						
R&S Index	Bank deregulation proxied by the weighted Rice-Strahan Index of interstate bank branching deregulation at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level *R&S Index* is based on Rice and Strahan (2010) and subsequent updates from individual state statutes, and ranges from zero (deregulated) to four (highly regulated) based on the regulation changes in a state. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	2.086	2.000	1.588	0.000	4.000
KNP Index	Bank deregulation proxied by the weighted Krishnan, Nandy, and Puri (2014) Index of interstate bank branching deregulation at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level *KNP Index* is based on Rice and Strahan (2010), plus the additional restriction for reciprocity between states, and subsequent updates from individual state statutes, and ranges from zero (deregulated) to five (highly regulated) based on the regulation changes in a state. *(Source: Krishnan, Nandy, and Puri (2014) and authors' calculations based on subsequent updates from individual state statutes)*.	2.689	2.315	1.635	0.000	5.000
Minimum Age	The weighted *Minimum Age* restriction at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level restriction is an indicator equal to one before the year that the minimum age restriction for acquisition was removed or state implements deregulation of this restriction. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	0.650	1.000	0.456	0.000	1.000
DeNovo Branching	The weighted *DeNovo Branching* restriction at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level restriction is an indicator equal to one before the year that de novo interstate branching restriction was removed or state implements deregulation of this restriction. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	0.544	0.926	0.481	0.000	1.000
Acquisition	The weighted *Acquisition* restriction at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level restriction is an indicator equal to one before the year that interstate branching by acquisition restriction was removed or state implements deregulation of this restriction. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	0.524	0.757	0.478	0.000	1.000
Deposit Cap	The weighted *Deposit Cap* restriction at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level restriction is an indicator equal to one before the year that statewide deposit cap on branch acquisitions restriction was removed or state implements deregulation of this restriction. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	0.369	0.000	0.465	0.000	1.000
Reciprocity	The weighted *Reciprocity* restriction at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level restriction is an indicator equal to one before the year that reciprocity restriction was removed or before state implements deregulation of this restriction. *(Source: Krishnan, Nandy, and Puri (2014) and authors' calculations based on subsequent updates from individual state statutes)*.	0.603	1.000	0.459	0.000	1.000
Panel C. Control Variables						
Intra	The weighted intrastate (early) deregulation index at the bank-level, where the weights are based on the proportions of bank deposits in each state. The state-level intrastate index is a binary variable equal to 1 in the years after the focal state implemented intrastate deregulation. *(Source: Jayaratne and Strahan, 1996)*.	0.989	1.000	0.100	0.000	1.000
Inter	The weighted interstate (early) deregulation index at the bank level, where the weights are based on the proportions of bank deposits in each state. The state-level interstate index is a binary variable equal to 1 in the years after the focal state implemented interstate deregulation *(Source: Black and Strahan, 2002)*.	0.994	1.000	0.077	0.000	1.000

Variables	Definition and Source	Mean	Median	Stdv	Min	Max
Panel C. Control Variables (cont.)						
Market-to-Book	Market value of equity divided by the book value of equity. *(Source: Authors' calculations based on the Compustat).*	1.481	1.383	0.678	0.433	2.942
Retail Deposits	Non-business transaction deposits + small certificates of deposits)/total liabilities. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.612	0.620	0.115	0.397	0.803
Business Loans	(C&I loans + commercial real estate loans + construction and land development loans)/ total loans. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.262	0.243	0.124	0.079	0.521
Off-Balance-Sheet	Total gross notional amount of all derivative contracts/total assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.034	0.000	0.059	0.000	0.177
ROA	Return on assets (net income/total assets). *(Source: Authors' calculations based on the Y-9C Reports)*.	0.009	0.010	0.005	-0.003	0.018
StdvROA	Standard deviation of ROA over the past 12 quarters. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.004	0.002	0.005	0.001	0.018
Cost Efficiency	Noninterest expense/ (net interest income + noninterest income). *(Source: Authors' calculations based on the Y-9C Reports).*	0.663	0.655	0.105	0.477	0.889
M&A	Number of acquisitions in the following year. *(Source: Authors' calculations based on the Federal Reserve Bank of Chicago M&As and Acquisitions data).*	0.048	0.000	0.263	0.000	8.000
Ln(Assets)	Natural logarithm of total assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	14.498	14.278	1.269	12.281	16.610
Undercapitalized	Dummy variable equal to one if the bank capital ratio lies below its target level. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.481	0.000	0.499	0.000	1.000
Junk	Dummy variable equal to one if bond rating is lower than BBB-. *(Source: Authors' calculations based on the Compustat S&P Ratings)*.	0.001	0.000	0.023	0.000	1.000
BBB	Dummy variable equal to one if bond rating is BBB. *(Source: Authors' calculations based on the Compustat S&P Ratings)*.	0.063	0.000	0.244	0.000	1.000
Missing Rating	Dummy variable equal to one if bond rating is missing. *(Source: Authors' calculations based on the Compustat S&P Ratings)*.	0.824	1.000	0.381	0.000	1.000
GDP Growth	Annual GDP growth. *(Source: The Bureau of Economic Analysis)*.	2.582	2.719	1.645	-2.776	4.685
Inflation	Annual inflation expressed using the GDP deflator. *(Source: FRED Economic Data)*.	2.202	2.086	0.754	0.759	3.888
Panel D. Variables Used in Robustness Tests						
R&S Index HDQ	Bank deregulation proxied by the Rice-Strahan Index of interstate bank branching deregulation at the bank state headquarters level. The state-level *R&S Index* is based on Rice and Strahan (2010) and subsequent updates from individual state statutes, and ranges from zero (deregulated) to four (highly regulated) based on the regulation changes in a state. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	2.069	2.000	1.639	0.000	4.000
KNP Index HDQ	Bank deregulation proxied by the Krishnan, Nandy, and Puri (2014) Index of interstate bank branching deregulation at the bank state headquarters level. The state-level *KNP Index* is based on Rice and Strahan (2010), plus the additional restriction for reciprocity between states, and subsequent updates from individual state statutes, and ranges from zero (deregulated) to five (highly regulated) based on the regulation changes in a state. *(Source: Krishnan, Nandy, and Puri (2014) and authors' calculations based on subsequent updates from individual state statutes)*.	2.664	2.000	1.683	0.000	5.000
Leverage Ratio	Ratio of tier 1 capital to total (unweighted) assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.089	0.087	0.019	0.056	0.138
Do-Nothing Leverage	(Lagged leverage ratio + net income - lagged dividends)/total assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.085	0.082	0.020	0.051	0.135
Tier 1 Capital Ratio	Ratio of tier 1 capital to risk-weighted assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.126	0.119	0.034	0.076	0.233
Do-Nothing Tier 1 Capital	(Lagged tier 1 capital ratio + net income - lagged dividends)/total risk-weighted assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.123	0.116	0.036	0.070	0.232
Total Capital Ratio	Ratio of (tier 1 + tier 2) capital to risk-weighted assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.142	0.135	0.033	0.095	0.250
Do-Nothing Total Capital	(Lagged total capital ratio + net income - lagged dividends)/total risk-weighted assets. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.138	0.131	0.036	0.086	0.250
Small Bank Share	The ratio of deposits in the state held in small banks branches (banks with total assets less or equal to $1 billion) divided by total bank branches. *(Source: Authors' calculations based on the FDIC Summary of Deposits)*.	0.464	0.440	0.169	0.097	0.992
Relative Size Insurance	The ratio of value added from insurance to value added from insurance and banking. *(Source: The Bureau of Economic Analysis)*.	0.455	0.449	0.112	0.160	0.820
Fraction Small Establishments	The fraction of total establishments with fewer than 20 employees in the state, as a proxy for the share of small nonfinancial firms (i.e., the share of bank-dependent borrowers). *(Source: U.S. Census Bureau)*.	0.693	0.693	0.035	0.589	0.795
Unit Banking Law	A dummy for whether the state had unit banking regulation in 1979 that required each bank be confined to a single building with no external bank branches. *(Source: Stiroh and Strahan, 2003)*.	0.144	0.000	0.326	0.000	1.000

Variables	Definition and Source	Mean	Median	Stdv	Min	Max
Panel D. Variables Used in Robustness Tests (cont.)						
Democrat Governor	An indicator equal to one if the state Governor is a Democrat. *(Source: Book of the States)*.	0.473	0.285	0.466	0.000	1.000
Democrat Legislature	An indicator equal to one if the majority of State Legislators register as Democrats. *(Source: Book of the States)*.	0.457	0.186	0.466	0.000	1.000
RegCh1	A dummy equal to 1 from the year a deregulation change occurs in the state in which the bank is headquartered until the second regulatory change, and 0 otherwise. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	0.604	1.000	0.489	0.000	1.000
RegCh2	A dummy equal to 1 from the year a deregulation change occurs in the state in which the bank is headquartered until the end of the sample, and 0 otherwise. *(Source: Rice and Strahan (2010) and authors' calculations based on subsequent updates from individual state statutes)*.	0.679	1.000	0.467	0.000	1.000
Fed Fund Rate	The effective federal funds rate. *(Source: FRED Economic Data)*.	3.560	3.880	2.515	0.090	9.210
TED Spread	The spread between 3-month LIBOR and 3-month Treasury bill. *(Source: FRED Economic Data)*.	0.477	0.360	0.387	0.170	1.410
Income Diversification	1-| (net interest income-total noninterest income)/total operating income| as in Laeven and Levine (2007). *(Source: Authors' calculations based on the Y-9C Reports)*.	0.209	0.233	0.196	-0.194	0.502
Asset Diversification	1-|(net loans-other earning assets)/total earning assets| as in Goetz, Laeven, and Levine (2016). *(Source: Authors' calculations based on the Y-9C Reports)*.	0.660	0.662	0.176	0.334	0.964
State Coincident Index Exposure	The state-level Philadelphia Federal Reserve Bank's Coincident Index combines four economic indicators: nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the Consumer Price Index into a single statistic. *(Source: Federal Reserve Bank of Philadelphia)*.	0.022	0.028	0.030	-0.121	0.118
Number of Branches	The number of branches per dollar of bank assets multiplied by 1000. *(Source: Authors' calculations based on the FDIC Summary of Deposits)*.	0.020	0.019	0.012	0.000	0.127
State Presence	The number of U.S. states in which a bank operates. *(Source: Authors' calculations based on the FDIC Summary of Deposits)*.	2.359	1.000	3.289	1.000	42.000
Metropolitan Areas	The percent of bank operations in metropolitan statistical areas (MSAs) and New England county metropolitan areas (NECMAs). *(Source: Authors' calculations based on the FDIC Summary of Deposits)*.	0.814	0.951	0.269	0.000	1.000
Cost of Funding	A measure of cost of funding calculated as total interest expenses over interest-bearing liabilities as in Levine, Lin, and Xie (2016). *(Source: Authors' calculations based on Y-9C Reports)*.	0.028	0.028	0.016	0.000	0.187
Expected Default Frequency	The normal transform of the distance-to-default measure using bank-level stock return data from CRSP and Financial data from the Call Report. We model the market equity value of a bank as a call option on the bank's assets, where we use the market value of equity to proxy for the market value of the bank and total liabilities to proxy for the face value of debt following Acharya, Anginer, and Warburton (2016). The call option on the bank's assets is given as follows: $V_E = V_A e^{-T} N(d_1) - X e^{-rT} N(d_2) + (1 - e^{-T}) V_A$; (i) $d_1 = [ln(V_A/X) + (r + s_A^2/2)T]/s_A\sqrt{T}$; $d_2 = d_1 - s_A\sqrt{T}$, where V_E is the market value of a bank, V_A is the value of the bank's total assets, X is the face value of debt proxied by the total bank liabilities, T equals 1 year, r is the market yield on U.S. Treasury Securities at 1-year constant maturity, which we take to be the risk-free rate, s_A is the volatility of the value of assets, which is related to equity volatility s_E, which is the standard deviation of daily equity returns over each time period calculated as follows: (ii) $s_E = \left[V_A e^{(-T)} N(d_1) s_A\right] / (V_E)$. We simultaneously solve equations (i) and (ii) to obtain the values of V_A and s_A. Once we determine V_A, we follow Hillegeist, Keating, Cram, and Lundstedt (2004) and Acharya, Anginer, and Warburton (2016) and compute a bank's asset returns as $m = max\left[\left(V_{A,t}/V_{A,t-1}\right) - 1, r\right]$. Finally, we compute the Merton Expected Default Frequency as $N\left[-(ln(V_A/X) + (m - s_A^2/2)T))/(s_A\sqrt{T})\right]$. *(Source Authors' calculations based on the CRSP data and Y-9C Reports)*.	0.036	0.001	0.106	0.000	0.999
Stock Beta	The market beta computed from daily returns over a one-year horizon derived from the Fama-French 3-factor model, in which we regress each bank's stock returns on the Fama-French three factors (Market, HML, and SMB). *(Source: Authors' calculations based on the CRSP data)*.	0.623	0.594	0.504	-1.297	4.595
Variables	**Definition and Source**	**Mean**	**Median**	**Stdv**	**Min**	**Max**

Panel D. Variables Used in Robustness Tests (cont.)						
Government Subsidy	The insurance premium per dollar of bank debt, a measure of government safety net benefits of the bank's government safety net value (due to explicit and implicit government guarantees of bank liabilities) as in Carbo-Valverde, Kane, and Rodriguez-Fernandez (2012) and Srivastav, Armitage, Hagendorff, and King (2018). Following prior research, we estimate the value of Implicit Insurance Premium (IPP) using the Merton's nonlinear model in which the fair insurance premium is stated as a percentage of a bank's debt (Merton, 1977). By guaranteeing bank debt, the government writes a put option whose value can be expressed as a percentage of a bank's debt as $IPP = N(y + s_A\sqrt{T}) - [(1-\delta)^n (V_A/X)N(y)]$, where $y = (\ln((X/V_A)(1-\delta)^n - (s_A^2 T/2))/(s_A\sqrt{T})$. X is the book value of liabilities, δ is the fraction of dividend to assets, n is the number of dividend payments per year, $N(\cdot)$ is the cumulative standard normal distribution, and T equals 1 year. The calculations of V_A (value of the bank's total assets) and s_A (the volatility of the value of assets) are the same as for the Expected Default Frequency measure above. Dividends are included in IPP valuation equation because the writer of the put option, the FDIC, is not dividend protected. *(Source: Authors' calculations based on the CRSP data and Y-9C Reports)*.	0.666	0.924	0.384	0.000	0.999
Institutional Ownership	The ratio of institutional shareholdings to bank outstanding shares. *(Source: Authors' calculations based on the Thomson-Reuters Institutional Holdings (13F) data)*.	0.260	0.198	0.217	0.000	1.342
Pressures from Regulators: Number of Enforcement Actions	The number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter. *(Source: Authors' calculations based on the FED, FDIC, OCC regulatory websites and SNL data)*.	0.433	0.000	2.659	0.000	100.000
Pressures from Regulators: Enforcement Actions Dummy	A dummy equal to one if the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter is greater than zero. *(Source: Authors' calculations based on the FED, FDIC, OCC regulatory websites and SNL data)*.	0.130	0.000	0.337	0.000	1.000
Pressures from Shareholders: Institutional Ownership	*The ratio of institutional shareholdings to bank outstanding shares. (Source: Authors' calculations based on the Thomson-Reuters Institutional Holdings (13F) data)*.	0.260	0.198	0.217	0.000	1.342
Pressures from Debtholders: Subordinated Debt	The ratio of subordinated debt to total debt. *(Source: Authors' calculations based on the Y-9C Reports)*.	0.004	0.000	0.009	0.000	0.154
Pressures from Depositors: Uninsured Deposits	The ratio of uninsured deposits to total bank deposits. To calculate uninsured deposits, we take all the funds in accounts that are partially insured and subtract off the amount that is insured. This requires separate treatment for several time periods because of the changes in deposit insurance limits over time. For the period 1986-2005, we calculate the uninsured deposits as the amount of bank deposit accounts (demand, savings, and time) with a balance on the report date of more than $100,000 minus the number of such deposit accounts multiplied by $100,000. For the period 2006-2008, we take into account the different treatment of deposit retirement accounts versus the rest. Thus, we calculate the uninsured deposits as the amount of bank deposit accounts (demand, savings, and time, excluding retirement accounts) with a balance on the report date of more than $100,000 minus the number of such deposit accounts multiplied by $100,000 plus the amount of bank deposit retirement accounts with a balance on the report date of more than $250,000 minus the number of such deposit accounts multiplied by $250,000. For the period 2009 onwards, we account for the deposit insurance limit increase from $100,000 to $250,000 for all deposits except foreign ones. Thus, we calculate the uninsured deposits as the amount of bank deposit accounts (demand, savings, and time, including retirement accounts) with a balance on the report date of more than $250,000 minus the number of such deposit accounts multiplied by $250,000. While the last change in deposit insurance took place in October 2008, the Call Report did not change to reflect it until 2009:Q3. For all time periods, we also add the foreign deposits to the uninsured deposits because foreign deposits are not covered by the FDIC deposit insurance. *(Source: Authors' calculations based on the Y-9C and Call Reports)*.	0.351	0.161	0.192	0.000	1.000
Z-Score	A measure of bank financial risk calculated as [Mean(ROA) + Mean(Equity/Assets)]/Stdv. ROA. A larger value indicates lower overall bank risk. Means of ROA and Equity/Assets and the standard deviation of ROA are all computed from quarterly data using the previous 12 quarters.	52.789	38.771	50.433	-0.992	456.889
Mean Equity Ratio	A component of Z-Score, mean of Equity/Assets computed from quarterly data using the previous 12 quarters.	0.088	0.086	0.020	0.057	0.130
Mean ROA	A component of Z-Score, mean of ROA computed from quarterly data using the previous 12 quarters.	0.009	0.010	0.006	-0.006	0.017
Stdv. ROA	A component of Z-Score, the standard deviation of ROA computed from quarterly data using the previous 12 quarters.	0.005	0.003	0.007	0.001	0.026
Non-Performing Loans	A measure of asset risk defined as the ratio of nonperforming loans (past due at least 90 days or in nonaccrual status) to total loans; a higher value indicates a riskier loan portfolio.	0.015	0.009	0.015	0.001	0.056

Table 2. Geographic Deregulation and Target Capital: Main Results

This table reports the regression estimates for analyzing the effects of geographic deregulation on bank target capital. Geographic deregulation is proxied by *R&S Index*, *KNP Index*, and their components. We estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets. Bank characteristics are: *Do-Nothing Capital*, (lagged equity capital + net income - lagged dividends)/total assets; *Market-to-Book*, market value of equity divided by the book value of equity; *Retail Deposits*, (non-business transaction deposits + small certificates of deposits)/total liabilities; *Business Loans*, (C&I loans + commercial real estate loans + construction and land development loans)/ total loans; *Off-Balance-Sheet*, total gross notional amount of all derivative contracts/total assets; *ROA*, return on assets (net income/total assets); *StdvROA*, standard deviation of *ROA* over the past 12 quarters; *Cost Efficiency*, noninterest expense/ (net interest income + noninterest income); *M&A*, the number of acquisitions in the following year; and *Ln(Assets)*, the natural logarithm of total assets. All models include early deregulation indices (*Intra* and *Inter*), bank fixed effects, and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables							
R&S Index	-0.0027***						
	(-18.998)						
KNP Index		-0.0021***					
		(-18.326)					
Minimum Age			-0.0157***				
			(-20.570)				
DeNovo Branching				-0.0100***			
				(-19.997)			
Acquisition					-0.0107***		
					(-18.309)		
Deposit Cap						-0.0068***	
						(-15.627)	
Reciprocity							-0.0047***
							(-9.804)
Do-Nothing Capital	0.6353***	0.6422***	0.6254***	0.6315***	0.6391***	0.6584***	0.6773***
	(28.536)	(29.599)	(28.147)	(27.112)	(28.832)	(30.318)	(32.201)
Market-to-Book	-0.0034***	-0.0037***	-0.0030***	-0.0022***	-0.0037***	-0.0040***	-0.0035***
	(-20.696)	(-21.804)	(-16.573)	(-13.389)	(-21.444)	(-23.198)	(-19.613)
Retail Deposits	0.0270***	0.0238***	0.0287***	0.0247***	0.0266***	0.0214***	0.0091***
	(11.512)	(10.431)	(10.809)	(10.939)	(11.133)	(9.468)	(4.192)
Business Loans	0.0060***	0.0049***	0.0051***	0.0114***	0.0047**	0.0003	-0.0016
	(3.174)	(2.612)	(2.602)	(5.770)	(2.454)	(0.151)	(-0.809)
Off-Balance-Sheet	0.0009	0.0003	0.0001	0.0039	0.0001	-0.0023	-0.0051
	(0.195)	(0.070)	(0.018)	(0.885)	(0.027)	(-0.510)	(-1.123)
ROA	0.0835***	0.0865***	0.0407	0.0692**	0.0664**	0.0809***	0.0420
	(2.993)	(3.057)	(1.293)	(2.375)	(2.401)	(2.735)	(1.301)
StdvROA	-0.1389***	-0.1401***	-0.1174***	-0.1424***	-0.1244***	-0.1553***	-0.1380***
	(-4.239)	(-4.282)	(-3.416)	(-4.437)	(-3.744)	(-4.714)	(-3.983)
Cost Efficiency	-0.0083***	-0.0070***	-0.0110***	-0.0094***	-0.0096***	-0.0064***	-0.0069***
	(-4.990)	(-4.366)	(-5.973)	(-5.428)	(-5.578)	(-3.862)	(-4.345)
M&A	0.0081***	0.0081***	0.0077***	0.0083***	0.0082***	0.0084***	0.0083***
	(22.404)	(22.396)	(20.967)	(23.353)	(22.251)	(23.010)	(21.943)
Ln(Assets)	0.0003	0.0005	0.0001	-0.0006*	0.0002	0.0011***	0.0010***
	(0.917)	(1.579)	(0.402)	(-1.775)	(0.559)	(3.377)	(2.747)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.717	0.732	0.634	0.712	0.690	0.714	0.662

Table 3. Geographic Deregulation and Target Capital: Robustness Tests

This table reports robustness tests for the effects of geographic deregulation on bank target capital. Geographic deregulation is proxied by *R&S Index* (the results are very similar with *KNP Index* and are reported in Appendix, Table A1). We estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets. Bank characteristics are: *Do-Nothing Capital*, (lagged equity capital + net income - lagged dividends)/total assets; *Market-to-Book*, market value of equity divided by the book value of equity; *Retail Deposits*, (non-business transaction deposits + small certificates of deposits)/total liabilities; *Business Loans*, (C&I loans + commercial real estate loans + construction and land development loans)/ total loans; *Off-Balance-Sheet*, total gross notional amount of all derivative contracts/total assets; *ROA*, return on assets (net income/total assets); *StdvROA*, standard deviation of *ROA* over the past 12 quarters; *Cost Efficiency*, noninterest expense/ (net interest income + noninterest income); *M&A*, the number of acquisitions in the following year; and *Ln(Assets)*, the natural logarithm of total assets.

Panel A reports tests related to alternative deregulation and capital measures, model specifications, and subsample results. Columns (1) – (4) employ alternative deregulation and capital measures. Column (1) uses the unweighted *R&S Index HDQ.* Column (2) – (4) present regression estimates using alternative capital measures: *Leverage Ratio* and *Do-Nothing Leverage* in Column (2), *Tier 1 Capital Ratio* and *Do-Nothing Tier 1 Capital* in Column (3), *Total Capital Ratio* and *Do-Nothing Total Capital* in Column (4). Columns (5) – (8) treat deregulation as endogenous. Column (5) presents regression estimates using *Equity Ratio,* controlling for *Do-Nothing Capital* (as in our main specification) with the addition of state fixed effects as instruments for deregulation. Column (6) instruments deregulation with its own lags and state-level instruments from Kroszner and Strahan (1999) and Rice and Strahan (2010): *Small Bank Share*, *Relative Size Insurance*, *Fraction Small Establishments*, *Unit Banking Law*, *Democrat Governor*, and *Democrat Legislature*. Column (7) instruments deregulation with its own lags, state-level controls, and state fixed effects. Column (8) shows weighted regression estimates using bank-level data aggregated at state-level, with weights that are proportional to the number of banks in each state. In Column (9), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Area)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's land area. Similarly, In Column (10), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Border)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's border length area. Columns (11) – (13) represent subsample analyses to evaluate the existence of survivorship bias. Column (11) presents main regression estimates using surviving banks only. Column (12) presents main regression estimates using acquiring banks only. Column (13) presents main regression estimates using all remaining banks (banks not acquiring nor surviving).

Panel B reports additional robustness tests related to the sample composition in Columns (1) – (5) and alternative explanations in Columns (6) – (13). Column (1) restricts the sample to banks that do not relocate their headquarters anytime during the sample period. Column (2) excludes banks headquartered in South Dakota and Delaware since these states had changes in their laws that encouraged the entry of credit card banks shortly before removing branching restrictions. Column (3) excludes observations from the recent financial crisis of 2007-2009. Column (4) includes both public and private banks. Column (5) includes only private banks. In both columns, we include all controls from our main specification, except for *Market-to-Book*, which cannot be constructed for private banks. Column (6) presents results using *Equity Ratio,* equity to total assets as a dependent variable and lagged equity to total assets as the control variable. Column (7) replaces *R&S Index* with the change in *R&S Index*. Columns (8) and (9) replace *R&S Index* with a difference-in-differences (DID) term, *RegCh1* and *RegCh2*, respectively. Both specifications include all controls from the main specification, in addition to bank, time, and state fixed effects. In Column (8), *RegCh1* is a dummy equal to 1 from the year a deregulation change occurs in the state in which the bank is headquartered until the second regulatory change, and 0 otherwise. This specification allows us to compare treated banks (banks headquartered in deregulated states) with control banks (banks headquartered in states that maintain all regulatory restrictions) before and after the treatment (first deregulation change). We stop the sample at the second regulatory change because all but one state deregulate after this event. In Column (9), *RegCh2* is a dummy equal to 1 from the year a deregulation change occurs in the state in which the bank is headquartered until the end of the sample, and 0 otherwise. This specification uses all events and years, except that after the first two regulatory events, all states are treated (deregulated). Column (10) employs the fed funds rate and the TED spread as additional controls in our main specification to take into account the effects of the banking environment. Column (11) employs an additional control for the deregulation index in the main specification to control for parallel trends. *Before (2,1)* is a dummy variable that equals one if the year is within two years prior to the interstate bank branching deregulation in the state of the bank (Krishnan, Nandy, and Puri, 2014). This variable captures the difference in the target capital for banks between the two years prior to deregulation in a state of a bank and the years prior to two years before the deregulation. Column (12) tests for mechanical mean reversion by eliminating banks with extreme capital ratio observations (greater than 90th or less than 10th percentiles of the distribution).

Panel C reports regression estimates for analyzing the effects of deregulation on bank target capital structure using placebo tests. Columns (1) – (5) present regression estimates when the deregulation is falsified to 1,2,3,4, or 5 years before the actual state deregulation year. Columns (6) – (10) present regression estimates when deregulation is falsified to 1,2,3,4, or 5 years after the actual state deregulation year. Column (11) presents regression estimates when states are randomly assigned into *R&S Index* values, maintaining the original distribution. Column (12) presents regression estimates when states are randomly assigned into deregulation dates with their corresponding index values.

Panel D reports regression estimates for analyzing the effects of deregulation on bank target capital structure using cross-sectional evidence. Columns (1) – (2) present results for small and large banks. Columns (3) – (4) present results for banks for low and high *ROA*. Columns (5) – (6) present results for banks for low and high *Market-to-Book* (MTB). Columns (7) – (8) present results for banks for low- and high-income *Diversification*. Columns (9) – (10) present results for banks for low and high *Asset Diversification.* Columns (11) – (12) present results for banks operating in local markets with low and high *State Coincident Index.* In Columns (13)-(24), we conduct subsamples of below- and above-median values of geographic diversification proxied in several ways.

Panel E reports results when using alternative measures of geographic deregulation and a gravity deregulation approach. In column (1), we rerun our results using *(1-HHI)* as our key independent measure instead of the *R&S Index*. Columns (2)-(5) report the 2nd stage results from a gravity deregulation model where target capital is regressed on the predicted value of geographic deregulation from the first stage *Predicted (1-HHI).* We report the 1st stage in Appendix A, Table A6. Columns (6)-(10) show results using additional measures of bank geographic expansion other than *(1-HHI)*: *Diversification Dummy* (an indicator for banks operating in multiple state), *Fraction of Out-of-State Depos*its, *Fraction of Out-of-State Branches*, *Ln(Average Distance HDQ to Subs)*, *Active Acquirer* (indicator for banks that acquire other institutions) and *Active Acquirer Out-of-State* (indicator for banks that acquire other institutions outside their home state).

For all panels, we estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets, unless it is specified otherwise in the column description above. All models include early deregulation indices (*Intra* and *Inter*), bank fixed effects, and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Robustness Tests: Alternative Measures of Deregulation and Capital, Different Empirical Specifications, and Subsample Analyses

	Alt. Deregulation	Alt. Capital Measures			Alt. Empirical Specifications: Endogeneity Tests						Subsample Analyses: Survivorship Bias		
Test	R&S Index HDQ	Leverage Ratio	Tier 1 Capital Ratio	Total Capital Ratio	State Fixed Effects	Using R&S Instruments: State Controls	Using R&S Instruments: State Controls and State Fixed Effects	State-Level Aggregation and R&S Instruments: State Controls	Using R&S of Neighbor States (Area) as Instrument	Using R&S of Neighbor States (Border) as Instrument	Surviving Banks Only	Acquired Banks Only	Other Banks
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent Variable	*Equity Ratio*	*Leverage Ratio*	*Tier 1 Capital Ratio*	*Total Capital Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables													
R&S Index	-0.0027***	-0.0020***	-0.0012***	-0.0020***	-0.0028***	-0.0016***	-0.0028***	-0.0028***	-0.0011***	-0.0011***	-0.0029***	-0.0024***	-0.0024***
	(-19.425)	(-12.041)	(-4.862)	(-4.208)	(-14.781)	(-5.254)	(-4.295)	(-3.344)	(-6.681)	(-6.585)	(-5.608)	(-5.911)	(-4.893)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Controls	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Fixed Effects	NO	NO	NO	NO	YES	NO	YES	NO	YES	YES	NO	NO	NO
Observations	8,757	7,903	7,861	7,847	9,072	9,072	9,072	1,103	9,072	8,759	2,169	3,759	3,190
Adjusted R-squared	0.720	0.622	0.746	0.425	0.672	0.685	0.433	0.188	0.770	0.770	0.666	0.697	0.748

Panel B. Robustness Tests: Sample Composition and Alternative Explanations

	Sample Composition: Exclude or Include Certain Observations					Alternative Explanations						
Test	Exclude Banks with HDQ Relocations	Exclude South Dakota and Delaware	Exclude Crisis Observations	Include Both Public and Private Banks	Include Private Banks Only	Replace *Do-Nothing Capital* with Lagged Equity Ratio	Replace *R&S Index* with Change in *R&S Index*	DID Estimator: Replace *R&S Index* with *RegCh1* (1st Dereg. Change)	DID Estimator: Replace *R&S Index* with *RegCh2* (All Dereg. Changes)	Add Banking Environ. Controls	Add Control for Parallel Trends	Test for Mechanical Mean Reversion
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(10)	(11)	(12)	(13)	(14)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
R&S Index	-0.0027***	-0.0027***	-0.0015***	-0.0021***	-0.0014***	-0.0030***	-0.0013***	0.0028***	0.0032***	-0.0017***	-0.0013**	-0.0026***
	(-19.425)	(-18.592)	(-4.051)	(-15.266)	(-5.953)	(-4.317)	(-3.015)	(8.845)	(11.251)	(-7.634)	(-2.036)	(-9.443)
Fed Fund Rate										-0.0011***		
										(-15.827)		
TED Spread										0.0049***		
										(15.355)		
Before (2,1)											-0.0010	
											(-0.348)	
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES
Lagged Equity Ratio	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Fixed Effects	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO
Observations	8,757	9,071	6,563	29,141	19,728	9,118	9,001	7,019	9,072	6,052	9,072	7,343
Adjusted R-squared	0.720	0.706	0.709	0.768	0.888	0.669	0.700	0.777	0.776	0.682	0.741	0.467

Panel C. Placebo Tests

Test	Placebo Tests: R&S Deregulation Falsified to:					Placebo Tests: R&S Deregulation Falsified to:					Random Assignments	
	1 Yr. Before Actual Deregulation	2 Yrs. Before Actual Deregulation	3 Yrs. Before Actual Deregulation	4 Yrs. Before Actual Deregulation	5 Yrs. Before Actual Deregulation	1 Yr. After Actual Deregulation	2 Yrs. After Actual Deregulation	3 Yrs. After Actual Deregulation	4 Yrs. After Actual Deregulation	5 Yrs. After Actual Deregulation	Random State Assignment into *R&S Index*	Random State Assignment into Deregulation Dates
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
Pseudo R&S Index	-0.0002	-0.0003	-0.0007	-0.0006	-0.0006	0.0001	-0.0002	-0.0004	-0.0003	-0.0014	-0.0079	0.0000
	(-0.486)	(-0.907)	(-1.450)	(-1.162)	(-1.002)	(0.162)	(-0.652)	(-0.968)	(-0.787)	(-1.101)	(-1.321)	(0.008)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.725	0.718	0.708	0.718	0.744	0.753	0.756	0.756	0.760	0.772	0.776	0.776

Panel D. Cross-Sectional Evidence

Criteria	Size		Return on Assets		Market-to-Book		Income Diversification		Asset Diversification		State Coincident Index Exposure	
Subsample	Small	Large	Low ROA	High ROA	Low MTB	High MTB	Low Income Diversification	High Income Diversification	Low Asset Diversification	High Asset Diversification	Low State Coincident Index	High State Coincident Index
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
R&S Index	-0.0013***	-0.0040***	-0.0030***	-0.0037***	-0.0029***	-0.0036***	-0.0032***	-0.0031***	-0.0044***	-0.0021***	-0.0024***	-0.0054***
	(-3.465)	(-10.078)	(-3.583)	(-6.620)	(-8.349)	(-5.928)	(-7.138)	(-6.019)	(-10.340)	(-6.492)	(-6.123)	(-4.775)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,545	4,527	4,528	4,544	4,527	4,545	4,644	4,428	4,541	4,531	4,505	4,486
Adjusted R-squared	0.758	0.651	0.653	0.489	0.803	0.400	0.488	0.547	0.422	0.689	0.687	0.589

Criteria	Geographic Diversification Dummy		Geographic Diversification (1-HHI)		Fraction Out-of-State Deposits		Fraction Out-of-State Branches		Ln (Average Distance HDQ to Subs)		Active Acquirers or Not	
Subsample	Low (=0)	High (=1)	Low	High	Low	High	Low	High	Low	High	Active Acquirers	Other Banks
Column	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
R&S Index	-0.0018***	-0.0032***	-0.0018***	-0.0034***	-0.0018***	-0.0036***	-0.0017***	-0.0036***	-0.0017***	-0.0036***	-0.0042***	-0.0019***
	(-3.9304)	(-6.9000)	(-4.0509)	(-7.3431)	(-4.0125)	(-7.7194)	(-3.9440)	(-7.6722)	(-3.9440)	(-7.6722)	(-6.936)	(-6.025)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	5,448	3,624	5,448	3,624	5,444	3,628	5,439	3,633	5,439	3,633	3,374	5.698
Adjusted R-squared	0.6139	0.6399	0.6139	0.6399	0.6148	0.6590	0.6110	0.6571	0.6110	0.6571	0.612	0.743

Panel E. Robustness Tests Target: Gravity Deregulation Approach and Alternative Measures of Geographic Expansion

	GMM using (1-HHI)	IV GMM 2nd Stage Results using (1-HHI) as Geographic Expansion Measure and a Gravity Deregulation Approach				GMM using Other Geographic Expansion Measures				
Test	(1-HHI)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: Fractional Logistic Regression 1)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: Fractional Logistic Regression 2)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: OLS Regression 1)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: OLS Regression 2)	Diversification Dummy (=1 if Bank Operates in Multiple States)	Fraction of Out-of-State Deposits	Ln (Average Distance HDQ to Subs)	Active Acquirer Dummy	Active Acquirer Out-of-State
Column	(1)	(2)	(3)	(4)	(5)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables										
1-HHI	0.0120***	0.0575***	0.0575***	0.0649***	0.0649***					
	(6.023)	(7.555)	(7.533)	(6.796)	(6.795)					
Diversification Dummy						0.0051***				
						(9.573)				
Fraction of Out-of-State Deposits							0.0043***			
							(15.999)			
Ln (Average Distance HDQ to Subs)								0.0049***		
								(16.809)		
Active Acquirer									0.0199***	
									(18.656)	
Active Acquirer – Out-of-State										0.0401***
										(16.933)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,051	8,430	8,430	9,072	9,072
Adjusted R-squared	0.713	0.563	0.563	0.505	0.505	0.7375	0.7068	0.7114	0.6227	0.4352

Table 4. Geographic Deregulation and Target Capital: Potential Channels

This table reports the regression estimates for analyzing the effects of geographic deregulation on bank target capital with additional interactions for potential channels. geographic deregulation is proxied by *R&S Index*. We estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets. We treat the channel characteristics as endogenous and employ all valid lags of these variables as instruments in the regressions. To be able to interpret the relative magnitudes, we demean and rescale the characteristics by their standard deviation. Panel A reports results using interactions with the capital structure determinants (*Market-to-Book, Retail Deposits, Business Loans, Off-Balance-Sheet, ROA, StdvROA, Cost Efficiency, M&A,* and *Ln(Assets)*) as proxies for the channels. Panel B reports results using interactions with alternative proxies for the channels (*Number of Branches*, *State Presence, Metropolitan Areas, Cost of Funding, Expected Default Frequency, Stock Beta, Government Subsidy,* and *Institutional Ownership*). All models include early deregulation indices (*Intra* and *Inter*), bank fixed effects, and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Capital Structure Determinants as Proxies for the Channels

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables										
R&S Index × Market-to-Book	-0.0025***									-0.0017***
	(-9.340)									(-5.487)
R&S Index × Retail Deposits		0.0010***								-0.0003
		(4.685)								(-1.102)
R&S Index × Business Loans			-0.0022***							-0.0018***
			(-7.549)							(-5.154)
R&S Index × Off-Balance-Sheet				-0.0004***						0.0002
				(-3.161)						(1.150)
R&S Index × ROA					-0.0020***					-0.0005*
					(-11.483)					(-1.712)
R&S Index × StdvROA						0.0007***				-0.0000
						(4.572)				(-0.057)
R&S Index × Cost Efficiency							0.0015***			-0.0000
							(6.786)			(-0.114)
R&S Index × M&A								-0.0007***		-0.0004***
								(-7.835)		(-4.261)
R&S Index × Ln(Assets)									-0.0008***	-0.0001
									(-3.422)	(-0.382)
R&S Index	-0.0004	-0.0024***	-0.0030***	-0.0021***	-0.0007	-0.0018***	-0.0015**	-0.0018***	-0.0013**	-0.0013*
	(-0.632)	(-4.237)	(-4.857)	(-3.710)	(-1.267)	(-3.255)	(-2.430)	(-3.090)	(-2.164)	(-1.683)
Do-Nothing Capital	0.6427***	0.6324***	0.6291***	0.6392***	0.6442***	0.6433***	0.6466***	0.6463***	0.6321***	0.6345***
	(28.064)	(28.289)	(27.073)	(29.705)	(30.734)	(30.186)	(28.542)	(30.671)	(28.181)	(25.700)
Market-to-Book	0.0053***	-0.0004	-0.0004	-0.0002	-0.0001	-0.0003	-0.0003	-0.0002	-0.0003	0.0035**
	(3.825)	(-0.803)	(-0.732)	(-0.369)	(-0.225)	(-0.549)	(-0.500)	(-0.314)	(-0.543)	(2.066)
Retail Deposits	0.0014**	-0.0002	0.0012*	0.0015***	0.0014**	0.0018***	0.0015**	0.0015**	0.0015**	0.0018
	(2.236)	(-0.222)	(1.910)	(2.609)	(2.211)	(2.801)	(2.358)	(2.573)	(2.427)	(1.530)
Business Loans	0.0017**	0.0020***	0.0076***	0.0016**	0.0015**	0.0018***	0.0016**	0.0017***	0.0016**	0.0060***
	(2.368)	(3.003)	(4.240)	(2.476)	(2.236)	(2.746)	(2.374)	(2.652)	(2.300)	(2.893)
Off-Balance-Sheet	0.0011***	0.0011***	0.0011***	0.0021***	0.0009**	0.0010***	0.0011***	0.0010***	0.0011***	0.0006
	(2.898)	(2.863)	(2.680)	(2.907)	(2.538)	(2.814)	(2.985)	(2.700)	(2.903)	(0.580)
ROA	0.0011***	0.0007*	0.0007*	0.0006*	0.0057***	0.0008**	0.0007*	0.0007*	0.0007**	0.0020
	(2.741)	(1.876)	(1.732)	(1.741)	(4.167)	(2.128)	(1.737)	(1.870)	(1.973)	(1.217)
StdvROA	-0.0004	-0.0004	-0.0003	-0.0004	-0.0006*	-0.0020**	-0.0004	-0.0003	-0.0004	-0.0003
	(-1.133)	(-1.143)	(-0.879)	(-1.293)	(-1.693)	(-2.168)	(-1.152)	(-1.033)	(-1.325)	(-0.316)
Cost Efficiency	-0.0011**	-0.0014***	-0.0013***	-0.0013***	-0.0012**	-0.0015***	-0.0047***	-0.0013***	-0.0013***	-0.0012
	(-2.251)	(-3.051)	(-2.756)	(-2.803)	(-2.564)	(-3.197)	(-3.864)	(-2.731)	(-2.651)	(-0.835)
M&A	0.0011***	0.0011***	0.0010***	0.0011***	0.0011***	0.0011***	0.0011***	0.0025***	0.0011***	0.0018***
	(7.022)	(6.933)	(6.629)	(7.126)	(7.397)	(7.154)	(7.224)	(4.446)	(7.151)	(3.282)
Ln(Assets)	-0.0053***	-0.0045***	-0.0055***	-0.0050***	-0.0053***	-0.0053***	-0.0057***	-0.0049***	-0.0033**	-0.0053***
	(-5.284)	(-4.147)	(-4.920)	(-5.074)	(-5.567)	(-5.446)	(-5.843)	(-4.762)	(-2.221)	(-2.917)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.719	0.741	0.693	0.751	0.728	0.730	0.723	0.756	0.752	0.708

Panel B. Alternative Proxies for the Channels

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables									
R&S Index × Number of Branches	-0.0014**								-0.0008***
	(-2.560)								(-9.836)
R&S Index × State Presence		-0.0025***							-0.0002**
		(-4.579)							(-2.366)
R&S Index × Metropolitan Areas			-0.0043***						-0.0006***
			(-3.669)						(-3.438)
R&S Index × Cost of Funding				-0.0002***					-0.0007***
				(-5.355)					(-10.615)
R&S Index × Expected Default Frequency					-0.0008***				-0.0004***
					(-3.306)				(-6.563)
R&S Index × Stock Beta						-0.0018***			0.0000
						(-5.302)			(0.109)
R&S Index × Government Subsidy							0.0015***		0.0007***
							(8.766)		(13.169)
R&S Index × Institutional Ownership								-0.0004***	0.0002
								(-23.920)	(1.305)
R&S Index	-0.0024***	-0.0017***	-0.0015***	-0.0009***	-0.0026***	-0.0026***	-0.0019***	-0.0007**	0.0001
	(-7.193)	(-4.869)	(-2.951)	(-27.509)	(-10.137)	(-10.131)	(-7.677)	(-2.186)	(0.978)
Number of Branches	-0.0000								0.0000***
	(-0.111)								(6.558)
State Presence		0.0104***							0.0042***
		(4.291)							(7.311)
Metropolitan Areas			0.0135***						0.0033***
			(2.819)						(2.655)
Cost of Funding				-0.0011***					0.0011***
				(-10.857)					(5.572)
Expected Default Frequency					0.0021***				0.0010***
					(3.293)				(5.536)
Stock Beta						0.0051***			0.0012***
						(4.539)			(3.737)
Government Subsidy							-0.0050***		-0.0027***
							(-8.718)		(-17.408)
Institutional Ownership								0.0103***	0.0027***
								(8.624)	(10.258)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	8,816	9,023	8,901	7,544	7,363
Adjusted R-squared	0.681	0.630	0.593	0.767	0.718	0.707	0.736	0.648	0.780

Table 5. Geographic Deregulation and Capital Adjustment Speed: Main Results

This table reports main regression estimates for analyzing the effects of geographic deregulation on capital adjustment speed. Geographic deregulation is proxied by *R&S Index, KNP Index*, and their components. First, we estimate Equation (3) using system GMM and extract an estimate of target capital ratio according to Equation (4), which uses Equation (1) and the predicted values from Equation (3). Next, we substitute the estimated deviation from the target capital ratio obtained from Equation (5) into the partial adjustment Equation (7) to produce estimates of the determinants of bank adjustment speeds, as in Equation (8). The dependent variable is the actively managed capital ratio change (difference between *Equity Ratio* and *Do-Nothing Capital*). The key explanatory variables are the interactions of the estimated deviation with *R&S Index*, *KNP Index,* and their individual components. Bank characteristics are: *Undercapitalized* is a dummy variable equal to one if the bank capital ratio lies below its target level; *Junk* is a dummy variable equal to one if bond rating is lower than BBB-; *BBB* is a dummy variable equal to one if bond rating is than BBB. *Missing Rating* is a dummy variable equal to one if bond rating is missing; *GDP Growth* is the annual GDP growth; *Inflation* is the annual inflation. All models include early deregulation indices (*Intra* and *Inter*) and year fixed effects. The details of the definitions and measurements of all variables are reported in Table 1. Standard errors are bootstrapped to account for the generated regressor (Pagan, 1984; Faulkender, Flannery, Hankins, and Smith, 2012). *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables							
R&S Index	-0.0235***						
	(-4.051)						
KNP Index		-0.0287***					
		(-4.902)					
Minimum Age			-0.0545***				
			(-6.085)				
DeNovo Branching				-0.0511***			
				(-5.656)			
Acquisition					-0.0594***		
					(-6.732)		
Deposit Cap						-0.0805***	
						(-7.327)	
Reciprocity							-0.0119
							(-1.343)
Constant	0.2368**	0.2806**	0.1733*	0.1566*	0.1838**	0.1891**	0.1253
	(2.541)	(2.172)	(1.937)	(1.760)	(2.018)	(2.026)	(1.403)
Undercapitalized	-0.0208	-0.0209	-0.0545***	-0.0511***	-0.0594***	-0.0805***	-0.0119
	(-1.207)	(-1.143)	(-6.085)	(-5.656)	(-6.732)	(-7.327)	(-1.343)
Junk	0.1029	0.0775	-0.0089	-0.0089	-0.0103	-0.0092	-0.0074
	(0.355)	(0.264)	(-1.096)	(-1.096)	(-1.255)	(-1.120)	(-0.915)
BBB	0.0329	0.0269	0.1002	0.0814	0.1381	0.1427	0.1809
	(0.782)	(0.643)	(0.367)	(0.311)	(0.484)	(0.490)	(0.624)
Missing Rating	-0.0005	-0.0040	0.0434**	0.0414**	0.0397*	0.0435**	0.0482**
	(-0.017)	(-0.139)	(2.076)	(1.985)	(1.896)	(2.058)	(2.334)
GDP Growth	0.0077	0.0078	0.0258***	0.0271***	0.0270***	0.0330***	0.0243***
	(1.329)	(1.395)	(3.765)	(3.909)	(3.938)	(4.696)	(3.540)
Inflation	0.0295**	0.0349***	0.0056	0.0067	0.0086	0.0062	0.0134
	(2.012)	(2.794)	(0.389)	(0.468)	(0.598)	(0.425)	(0.944)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	9.072	9.072	9.072	9.072	9.072	9.072	9.072
Adjusted R-squared	0.479	0.480	0.465	0.476	0.477	0.474	0.462

Table 6. Geographic Deregulation and Capital Adjustment Speed: Robustness Tests

This table reports the regression estimates for analyzing the effects of geographic deregulation on capital adjustment speed using several robustness tests. Geographic deregulation is proxied by *R&S Index* (the results are very similar with *KNP Index* and are reported in Appendix, Table A3). First, we estimate Equation (3) using system GMM and extract an estimate of target capital ratio according to Equation (4), which uses Equation (1) and the predicted values from Equation (3). Next, we substitute the estimated deviation from the target capital ratio obtained from Equation (5) into the partial adjustment Equation (7) to produce estimates of the determinants of bank adjustment speeds, as in Equation (8).

Panel A Columns (1) – (2) reports the regression estimates for analyzing the effects of geographic deregulation on capital adjustment speed using asymmetry based on bank capitalization: below target in Column (1) and above target in Column (2). The capitalization dummy is excluded from the estimation.

Panel B Column (1) reports regression estimates when we randomly assign states into deregulation dates, maintaining the original distribution. Column (2) presents regression estimates when we randomly assign states into deregulation dates with their corresponding deregulation index values. In Column (3), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Area)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's land area. Similarly, In Column (4), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Border)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's border length area.

Panel C reports additional robustness tests related to the sample composition and alternative explanations for *R&S Index*. Column (1) restricts the sample to banks that do not relocate their headquarters anytime during the sample period. Column (2) excludes banks headquartered in South Dakota and Delaware since these states had changes in their laws that encouraged the entry of credit card banks shortly before removing branching restrictions. Column (3) excludes the recent financial crisis observations 2007-2009. Column (4) include both public and private banks, while Column (5) includes only private banks. In both columns, we include all controls from our main specification, except for *Market-to-Book*, which cannot be constructed for private banks. Column (6) replaces *R&S Index* with the change in *R&S Index*.

Columns (7) and (8) replace *R&S Index* with a difference-in-differences (DID) term, *RegCh1* and *RegCh2*, respectively. Both specifications include all controls from the main specification, in addition to bank, time, and state fixed effects. In Column (7), *RegCh1* is a dummy equal to 1 from the year a deregulation change occurs in the state in which the bank is headquartered until the second regulatory change, and 0 otherwise. This specification allows us to compare treated banks (banks headquartered in deregulated states) with control banks (banks headquartered in states that maintain all regulatory restrictions) before and after the treatment (first deregulation change). We stop the sample at the second regulatory change because all but one state deregulate after this event. In Column (8), *RegCh2* is a dummy equal to 1 from the year a deregulation change occurs in the state in which the bank is headquartered until the end of the sample, and 0 otherwise. This specification uses all events and years, except that after the first two regulatory events, all states are treated (deregulated). Column (9) employs the fed funds rate and the TED spread as additional controls in our main specification to take into account the effects of the banking environment. Column (10) employs an additional control for the deregulation index in the main specification to control for parallel trends. *Before (2,1)* is a dummy variable that equals one if the year is within two years prior to the interstate bank branching deregulation in the state of the bank (Krishnan, Nandy, and Puri, 2014). This variable captures the difference in the capital target for banks between the two years prior to deregulation in a state of a bank and the years prior to two years before the deregulation. Column (11) tests for mechanical mean reversion by eliminating banks with extreme capital ratio observations (greater than 90th or less than 10th percentiles of the distribution).

Panel D report results when controlling for additional stakeholder pressures for *R&S Index*. We include pressures from the regulators proxied by the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter and Federal Reserve district fixed effects in Column (1); pressures from the regulators proxied by a dummy equal to one if the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter is greater than zero, and Federal Reserve district fixed effects in Column (2); pressures from shareholders proxied by institutional ownership, the ratio of institutional shareholdings to bank outstanding shares in Column (3); pressures from debtholders proxied by the ratio of subordinated debt to total assets in Column (4); pressures from depositors proxied by the ratio of uninsured deposits to total deposits in Column (5); pressures from shareholders, debtholders, and depositors in the same regression in Column (6); all types of pressures when pressures from the regulators are proxied by the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter and Federal Reserve district fixed effects in Column (7); and all types of pressures when pressures from the regulators are proxied by a dummy equal to one if the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter is greater than zero, and Federal Reserve district fixed effects in Column (8).

Panel E reports results when using alternative measures of geographic deregulation and a gravity deregulation approach. In column (1), we rerun our results using *(1-HHI)* as our key independent measure instead of the *R&S Index*. Columns (2)-(5) report the 2nd stage results from a gravity deregulation model where speed of adjustment is regressed on the predicted value of geographic deregulation from the first stage *Predicted (1-HHI)*.

For all panels, the dependent variable is the actively managed capital ratio change (difference between *Equity Ratio* and *Do-Nothing Capital*). The key explanatory variables are the interactions of the estimated deviation with *R&S Index*. Bank characteristics are: *Undercapitalized* is a dummy variable equal to one if the bank capital ratio lies below its target level; *Junk* is a dummy variable equal to one if bond rating is lower than BBB-; *BBB* is a dummy variable equal to one if bond rating is than BBB. *Missing Rating* is a dummy variable equal to one if bond rating is missing; *GDP Growth* is the annual GDP growth; *Inflation* is the annual inflation. All models include early deregulation indices (*Intra* and *Inter*) and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. Standard errors are bootstrapped to account for the generated regressor (Pagan, 1984; Faulkender, Flannery, Hankins, and Smith, 2012). *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Asymmetry Based on Capitalization

	Asymmetry Based on Capitalization	
Subsample	Below Target Capital	Above Target Capital
Column	(1)	(2)
Dependent Variable	Δk	Δk
Independent Variables		
R&S Index	-0.0256***	-0.0159***
	(-6.843)	(-3.101)
Constant	YES	YES
Early Deregulation Indices	YES	YES
Other Bank Controls	YES	YES
Year Fixed Effects	YES	YES
Observations	5,817	3,255
Adjusted R-squared	0.521	0.331

Panel B. Placebo Tests and Endogeneity Tests

	Placebo Tests: Random Assignment		Endogeneity Tests	
Test	Random State Assignment into *R&S Index*	Random State Assignment into Deregulation Dates	Using R&S of Neighbor States (Area) as Instrument	Using R&S of Neighbor States (Border) as Instrument
Column	(1)	(2)	(3)	(4)
Dependent Variable	Δk	Δk	Δk	Δk
Independent Variables				
Placebo R&S Index	-0.0004	-0.0071	-0.0176***	-0.0292***
	(-0.100)	(-1.542)	(-6.175)	(-10.424)
Constant	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	9,072	9,072	9,072	8,759
Adjusted R-squared	0.2720	0.2550	0.333	0.326

Panel C. Sample Composition and Alternative Explanations

	Sample Composition: Exclude or Include Certain Observations					Alternative Explanations					
Test	Exclude Banks with HDQ Relocations	Exclude South Dakota and Delaware	Exclude Crisis Observations	Include Both Public and Private Banks	Include Private Banks Only	Replace *R&S Index* with the Change in *R&S Index*	DID Estimator: Replace *R&S Index* with *RegCh1* (1st Dereg. Change)	DID Estimator: Replace *R&S Index* with *RegCh2* (All Dereg. Changes)	Add Banking Environment Controls	Add Control for Parallel Trends	Test for Mechanical Mean Reversion
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables											
R&S Index	-0.0207***	-0.0212***	-0.0290***	-0.0205***	-0.0162***	-0.0197**	-0.0398***	-0.0455***	-0.0119***	-0.0237***	-0.0200***
	(-3.629)	(-4.044)	(-3.576)	(-5.842)	(-4.533)	(-2.552)	(-3.088)	(-3.497)	(-3.280)	(-3.953)	(-3.072)
Fed Fund Rate									-0.0094***		
									(-3.070)		
TED Spread									0.0751***		
									(5.380)		
Before (2,11)										0.0255	
										(1.330)	
Constant	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Fixed Effects	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO
Observations	8,757	9,030	6,563	29,141	19,728	8,427	7,019	9,072	6,052	9,072	7,304
Adjusted R-squared	0.424	0.471	0.533	0.385	0.336	0.429	0.462	0.444	0.474	0.467	0.585

Panel D. Control for Additional Stakeholder Pressures

Test	Add Control for Regulatory Pressures	Add Control for Regulatory Pressures	Add Control for Shareholder Pressures	Add Control for Debtholder Pressures	Add Control for Depositor Pressures	Add Control for Stakeholder Pressures	Add Control for Stakeholder Pressures	Add Control for Stakeholder Pressures
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables								
R&S Index	-0.0257***	-0.0258***	-0.0204***	-0.0246***	-0.0248***	-0.0200***	-0.0201***	-0.0203***
	(-8.680)	(-8.710)	(-6.473)	(-8.508)	(-8.549)	(-6.280)	(-6.141)	(-6.199)
Pressures from Regulators: Number of Enforcement Actions	0.0005						-0.0009	
	(0.323)						(-0.622)	
Pressures from Regulators: Enforcement Actions Dummy		-0.0125						-0.0235*
		(-1.079)						(-1.810)
Pressures from Shareholders: Institutional Ownership			0.2461***			0.2453***	0.2498***	0.2508***
			(11.832)			(11.572)	(11.680)	(11.737)
Pressures from Debtholders: Subordinated Debt				0.7962*		0.3306	0.3736	0.4238
				(1.755)		(0.598)	(0.673)	(0.763)
Pressures from Depositors: Uninsured Deposits					0.0069	-0.002	-0.0026	-0.0040
					(0.540)	(-0.144)	(-0.186)	(-0.284)
Constant	YES	YES	YES	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Fed District Fixed Effects	YES	YES	NO	NO	NO	NO	YES	YES
Observations	9,072	9,072	7,544	9,072	8,507	7,062	7,062	7,062
Adjusted R-squared	0.480	0.480	0.496	0.479	0.491	0.503	0.504	0.504

Panel E. Robustness Tests Speed: Gravity Deregulation Approach and Alternative Measures of Geographic Expansion

	GMM using (1-HHI)	IV GMM 2nd Stage Results using (1-HHI) as Geographic Expansion Measure and a Gravity Deregulation Approach			
Test	(1-HHI)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: Fractional Logistic Regression 1)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: Fractional Logistic Regression 2)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: OLS Regression 1)	(1-HHI) Instrumented by (1-Predicted HHI) (Stage 0: OLS Regression 2)
Column	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Δk	Δk	Δk	Δk	Δk
Independent Variables					
1-HHI	0.0731***	0.2448***	0.2451***	0.1600***	0.1581***
	(3.6371)	(8.4497)	(8.4602)	(6.7866)	(6.7188)
Constant	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.456	0.352	0.352	0.298	0.298

Table 7. Capital Adjustment Speeds: Potential Channels

This table reports the regression estimates for analyzing the effects of geographic deregulation on capital adjustment speed with additional interactions for potential channels. First, we estimate Equation (3) using system GMM and extract an estimate of target capital ratio according to Equation (4), which uses Equation (1) and the predicted values from Equation (3). Next, we substitute the estimated deviation from the target capital ratio obtained from Equation (5) into the partial adjustment Equation (7) to produce estimates of the determinants of bank adjustment speeds, as in Equation (8). The dependent variable is the actively managed capital ratio change (difference between *Equity Ratio* and *Do-Nothing Capital*). The key explanatory variables are the interactions of the estimated deviation with *R&S Index*. Bank characteristics are: *Undercapitalized* is a dummy variable equal to one if the bank capital ratio lies below its target level; *Junk* is a dummy variable equal to one if bond rating is lower than BBB-; *BBB* is a dummy variable equal to one if bond rating is than BBB. *Missing Rating* is a dummy variable equal to one if bond rating is missing; *GDP Growth* is the annual GDP growth; *Inflation* is the annual inflation. The table reports results using interactions with the adjustment speed determinants (*Undercapitalized, Junk, BBB, Missing rating, GDP Growth, Inflation*) as proxies for the channels. To be able to interpret the relative magnitudes, we demean and rescale the characteristics by their standard deviation. All models include early deregulation indices (*Intra* and *Inter*) and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. Standard errors are bootstrapped to account for the generated regressor (Pagan, 1984; Faulkender, Flannery, Hankins, and Smith, 2012). *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables							
R&S Index × Undercapitalized	-0.0007						0.0033
	(-0.210)						(0.922)
R&S Index × Junk		0.1211					0.1210
		(0.794)					(0.796)
R&S Index × BBB			-0.0020				-0.0001
			(-0.274)				(-0.009)
R&S Index × Missing Rating				0.0052			0.0012
				(1.087)			(0.180)
R&S Index × GDP Growth					-0.0033***		-0.0022*
					(-3.003)		(-1.933)
R&S Index × Inflation						-0.0145***	-0.0110***
						(-5.404)	(-3.870)
R&S Index	-0.0405***	-0.0418***	-0.0417***	-0.0445***	-0.0346***	-0.0130**	-0.0161*
	(-15.272)	(-20.860)	(-20.078)	(-9.974)	(-10.405)	(-2.203)	(-1.704)
Undercapitalized	-0.0160						-0.0211*
	(-1.347)						(-1.777)
Junk		-0.2563					-0.2278
		(-0.433)					(-0.386)
BBB			-0.0085				0.0144
			(-0.388)				(0.457)
Missing Rating				0.0172			0.0322
				(1.021)			(1.327)
GDP Growth					0.0145***		0.0093**
					(4.005)		(2.456)
Inflation						0.0559***	0.0474***
						(5.815)	(4.701)
Constant	YES	YES	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.283	0.282	0.282	0.285	0.284	0.285	0.289

Table 8. Deregulation and Bank Capital Adjustment Methods

This table evaluates the extent to which banks employ active capital management, passive capital adjustment, or active asset management to adjust their capital ratios in response to deregulation. We assess the impact of the interstate branching deregulation on annual growth rates from *t-1* to *t* in bank equity and assets. The dependent variables are growth rates in balance sheet components. We report estimates from a system of structural equations via three-stage least squares (3SLS, Zellner and Theil, 1962). The exogenous variables are taken to be instruments for the endogenous variables and consist of bank controls (*Market-to-Book*, market value of equity divided by the book value of equity; *Retail Deposits*, (non-business transaction deposits + small certificates of deposits)/total liabilities; *Business Loans*, (C&I loans + commercial real estate loans + construction and land development loans)/ total loans; *Off-Balance-Sheet*, total gross notional amount of all derivative contracts/total assets; *ROA*, return on assets (net income/total assets); *StdvROA*, standard deviation of *ROA* over the past 12 quarters; *Cost Efficiency*, noninterest expense/ (net interest income + noninterest income); *M&A*, the number of acquisitions in the following year; *Ln(Assets)*, the natural logarithm of total assets; and a constant), a time trend, and year fixed effects. The 3SLS estimation analysis allows for firms' asset and capital management policies to be simultaneously determined under changes in geographic deregulation as proxied by *Post Branching Deregulation* dummy. *Post Branching Deregulation* is an indicator variable that equals to zero during the period before the first interstate branching deregulation change in each bank's headquarters state, and to one during the period thereafter. The dependent variables consist of the annual growth rates from *t-1* to *t* in bank equity and assets and their various components. Columns 1-3 focus on changes in the numerator of the capital ratio, *Equity*, and distinguishes between internal (changes in retained earnings) and external (net issuances of shares, repurchases, and dividends) sources of capital. Columns 4-8 focus on changes in the denominator of the capital ratio, *Assets*, and shows changes in its components. Panel A documents the results for all sample banks. Panels B and C document the adjustments made by banks with above- and below-target capital. In fitting the data, we allow residuals to be correlated across the equations. Thus, the reported statistics account for cross-equation residual correlation. The regressions include unreported bank controls, time trend, and year fixed effects. The definitions and the sources of the variables are provided in Table 1 and/or in the text. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. All Banks

Group	Full Sample							
	Equity			Assets				
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	*%ΔTotal Equity*	*%ΔExternal Equity*	*%ΔInternal Equity*	*%ΔTotal Assets*	*%ΔLoans*	*%ΔOther Earning Assets*	*%ΔNon-Earning Assets*	*%ΔFixed Assets*
Independent Variables								
Post Branching Deregulation	1.9588***	2.0583**	-0.4609	2.5194***	-0.6485	-14.4231***	7.3579***	-2.0577***
	(4.650)	(2.099)	(-0.409)	(9.925)	(-1.645)	(-14.845)	(8.512)	(-4.348)
Bank controls	YES	YES	YES	YES	YES	YES	YES	YES
Time trend	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	7,699	7,699	7,699	7,699
Adjusted R-squared	0.076	0.067	0.038	0.033	0.048	0.045	0.010	0.022

Panel B. Banks with Above-Target Capital

Group	Banks with Above-Target Capital Ratio							
	Equity			Assets				
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	*%ΔTotal Equity*	*%ΔExternal Equity*	*%ΔInternal Equity*	*%ΔTotal Assets*	*%ΔLoans*	*%ΔOther Earning Assets*	*%ΔNon-Earning Assets*	*%ΔFixed Assets*
Independent Variables								
Post Branching Deregulation	-0.9242***	-0.0506	-0.9627	1.3418***	4.2253***	3.9907***	1.2356	-0.8988
	(-3.911)	(-0.042)	(-0.579)	(4.204)	(23.801)	(7.766)	(0.761)	(-1.108)
Bank controls	YES	YES	YES	YES	YES	YES	YES	YES
Time trend	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,319	3,319	3,319	3,319	2,773	2,773	2,773	2,773
Adjusted R-squared	0.005	0.055	0.022	0.045	0.224	0.038	0.070	0.077

Panel C. Banks with Below-Target Capital

Group	Banks with Below-Target Capital Ratio							
	Equity			Assets				
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variables	*%ΔTotal Equity*	*%ΔExternal Equity*	*%ΔInternal Equity*	*%ΔTotal Assets*	*%ΔLoans*	*%ΔOther Earning Assets*	*%ΔNon-Earning Assets*	*%ΔFixed Assets*
Independent Variables								
Post Branching Deregulation	3.1610***	2.6801**	-0.1090	3.6911***	-0.4181	-12.4789***	8.7971***	-1.6501***
	(5.265)	(2.099)	(-0.071)	(10.710)	(-0.794)	(-9.989)	(7.950)	(-2.614)
Bank controls	YES	YES	YES	YES	YES	YES	YES	YES
Time trend	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Observations	5,705	5,705	5,705	5,705	4,533	4,533	4,533	4,533
Adjusted R-squared	0.020	0.046	0.057	0.036	0.045	0.040	0.014	0.019

Internet Appendix for
"Geographic Deregulation and Bank Capital Structure"

Figure A1. Time-series variation in the *R&S Index* and the *KNP Index*

The figure plots yearly averages of the *R&S Index* and the *KNP Index* over the sample period.

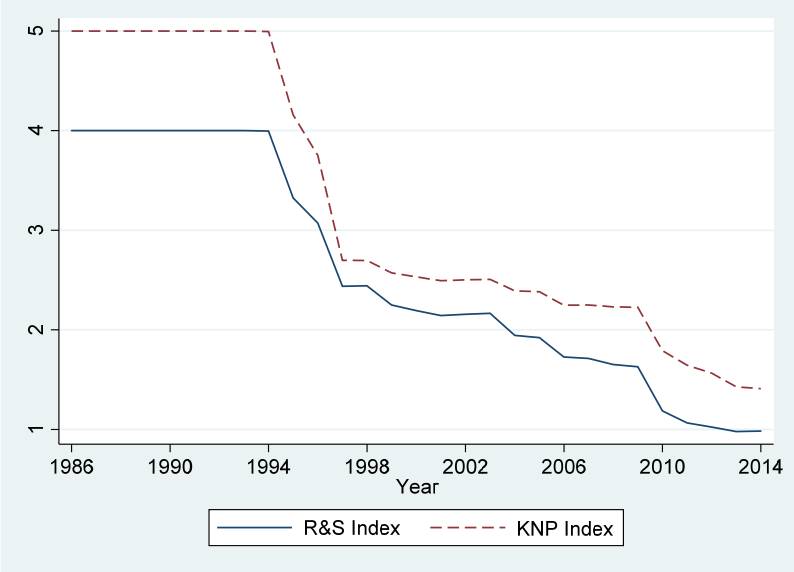

Figure A2. Time-series variation in the *Equity Ratio*

The figure plots yearly averages of the *Equity Ratio* over the sample period.

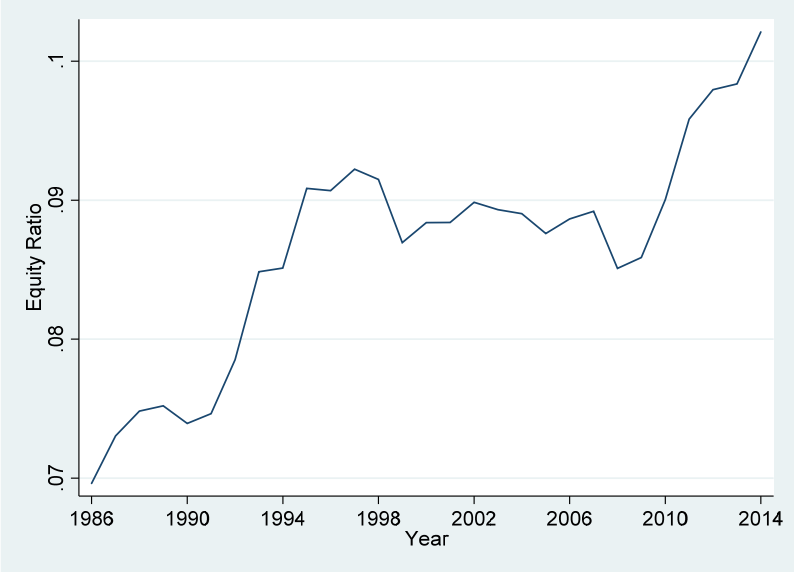

Table A1. Geographic Deregulation and Target Capital: Robustness Tests using *KNP Index*

This table reports robustness tests for the relation between bank deregulation and bank target capital when we proxy deregulation by *KNP Index*. We estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets. Bank characteristics are: *Do-Nothing Capital*, (lagged equity capital + net income - lagged dividends)/total assets; *Market-to-Book*, market value of equity divided by the book value of equity; *Retail Deposits*, (non-business transaction deposits + small certificates of deposits)/total liabilities; *Business Loans*, (C&I loans + commercial real estate loans + construction and land development loans)/ total loans; *Off-Balance-Sheet*, total gross notional amount of all derivative contracts/total assets; *ROA*, return on assets (net income/total assets); *StdvROA*, standard deviation of ROA over the past 12 quarters; *Cost Efficiency*, noninterest expense/ (net interest income + noninterest income); *M&A*, the number of acquisitions in the following year; and *Ln(Assets)*, the natural logarithm of total assets.

Panel A reports estimations when using alternative measures of deregulation and capital, different empirical specifications, and subsample analyses. Columns (1) – (4) employ alternative deregulation and capital measures. Column (1) uses the unweighted *KNP Index HDQ*. Columns (2) – (4) present regression estimates using alternative capital measures: *Leverage Ratio* and *Do-Nothing Leverage* in Column (2), *Tier 1 Capital Ratio* and *Do-Nothing Tier 1 Capital* in Column (3), *Total Capital Ratio* and *Do-Nothing Total Capital* in Column (4). Columns (5) – (8) treat deregulation as endogenous. Column (5) presents regression estimates using *Equity Ratio,* controlling for *Do-Nothing Capital* (as in our main specification) with the addition of state fixed effects as instruments for deregulation. Column (6) instruments deregulation with its own lags and state-level controls: *Small Bank Share*, *Relative Size Insurance*, *Fraction Small Establishments*, *Unit Banking Law*, *Democrat Governor*, and *Democrat Legislature*. Column (7) instruments deregulation with its own lags, state-level controls, and state fixed effects. Column (8) shows weighted regression estimates using bank-level data aggregated at state-level, with weights that are proportional to the number of banks in each state. In Column (9), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Area)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's land area. Similarly, In Column (10), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Border)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's border length area. Columns (11) – (13) represent subsample analyses to evaluate the existence of survivorship bias. Column (11) presents regression estimates using surviving banks only. Column (12) presents regression estimates using acquiring banks only. Column (13) presents regression estimates using all remaining banks (banks not acquiring nor surviving).

Panel B reports additional robustness tests related to the sample composition in Columns (1) – (5) and alternative explanations in Columns (6) – (11). Column (1) restricts the sample to banks that do not relocate their headquarters anytime during the sample period. Column (2) excludes banks headquartered in South Dakota and Delaware since these states had changes in their laws that encouraged the entry of credit card banks shortly before removing branching restrictions. Column (3) excludes observations from the recent financial crisis of 2007-2009. Column (4) includes both public and private banks. Column (5) includes only private banks. In both columns, we include all controls from our main specification, except for *Market-to-Book*, which cannot be constructed for private banks. Column (6) presents results using *Equity Ratio,* equity to total assets as a dependent variable and lagged equity to total assets as the control variable. Column (7) replaces *KNP Index* with the change in *KNP Index*.

Column (8) employs the fed funds rate and the TED spread as additional controls in our main specification to take into account the effects of the banking environment. Column (9) employs an additional control for the deregulation index in the main specification to control for parallel trends. *Before (2,1)* is a dummy variable that equals one if the year is within two years prior to the interstate bank branching deregulation in the state of the bank (Krishnan, Nandy, and Puri, 2014). This variable captures the difference in the target capital for banks between the two years prior to deregulation in a state of a bank and the years prior to two years before the deregulation. Column (10) tests for mechanical mean reversion by eliminating banks with extreme capital ratio observations (greater than 90th or less than 10th percentiles of the distribution).

Panel C presents the placebo tests. Columns (1) – (5) present regression estimates when the deregulation is falsified to 1,2,3,4, or 5 years before the actual state deregulation year. Columns (6) – (10) present regression estimates when deregulation is falsified to 1,2,3,4, or 5 years after the actual state deregulation year. Column (11) presents regression estimates when states are randomly assigned into *KNP Index* values, maintaining the original distribution. Column (12) presents regression estimates when states are randomly assigned into deregulation dates with their corresponding index values.

Panel D provides cross-sectional evidence. Columns (1) – (2) present results for small and large banks. Columns (3) – (4) present results for banks for low and high *ROA*. Columns (5) – (6) present results for banks for low and high *Market-to-Book* (MTB). Columns (7) – (8) present results for banks for low- and high-income *Diversification*. Columns (9) – (10) present results for banks for low and high *Asset Diversification.* Columns (11) – (12) present results for banks operating in local markets with low and high *State Coincident Index.* In Columns (13)-(24), we conduct subsamples of below- and above-median values of geographic diversification proxied in several ways.

For all panels, we estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets, unless it is specified otherwise in the column description above. All models include early deregulation indices (*Intra* and *Inter*), bank fixed effects, and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Robustness Tests: Alternative Measures of Deregulation and Capital, Different Empirical Specifications, and Subsample Analyses

	Alt. Deregulation	Alt. Capital Measures			Alt. Empirical Specifications: Endogeneity Tests						Subsample Analyses: Survivorship Bias		
Test	R&S Index HDQ	Leverage Ratio	Tier 1 Capital Ratio	Total Capital Ratio	State Fixed Effects	Using R&S Instruments: State Controls	Using R&S Instruments: State Controls and State Fixed Effects	State-Level Aggregation and R&S Instruments: State Controls	Using R&S of Neighbor States (Area) as Instrument	Using R&S of Neighbor States (Border) as Instrument	Surviving Banks Only	Acquired Banks Only	Other Banks
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Dependent Variable	*Equity Ratio*	*Leverage Ratio*	*Tier 1 Capital Ratio*	*Total Capital Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables													
R&S Index	-0.0021***	-0.0015***	-0.0009***	-0.0016***	-0.0021***	-0.0013***	-0.0018***	-0.0024***	-0.0010***	-0.0010***	-0.0023***	-0.0018***	-0.0021***
	(-18.679)	(-11.370)	(-4.609)	(-4.066)	(-13.845)	(-5.540)	(-3.551)	(-3.518)	(-8.764)	(-8.657)	(-5.903)	(-5.567)	(-4.776)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Controls	NO	NO	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
State Fixed Effects	NO	NO	NO	NO	YES	NO	YES	NO	YES	YES	NO	NO	NO
Observations	8.757	7,903	7,861	7,847	9,072	9,072	9,072	1,103	9,072	8,759	2,169	3,759	3,190
Adjusted R-squared	0.738	0.616	0.755	0.415	0.686	0.682	0.462	0.192	0.771	0.771	0.680	0.712	0.748

Panel B. Robustness Tests: Sample Composition and Alternative Explanations

	Sample Composition: Exclude or Include Certain Observations						Alternative Explanations			
Test	Exclude Banks with HDQ Relocations	Exclude South Dakota and Delaware	Exclude Crisis Observations	Include Both Public and Private Banks	Include Private Banks Only	Replace *Do-Nothing Capital* with Lagged Equity Ratio	Replace *KNP Index* with the Change in *KNP Index*	Add Banking Environ. Controls	Add Control for Parallel Trends	Test for Mechanical Mean Reversion
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables										
KNP Index	-0.0021***	-0.0021***	-0.0010***	-0.0015***	-0.0011***	-0.0026***	-0.0011***	-0.0013***	-0.0027***	-0.0020***
	(-18.679)	(-17.796)	(-3.318)	(-14.799)	(-5.704)	(-4.116)	(-2.946)	(-7.352)	(-4.470)	(-9.219)
Fed Fund Rate								-0.0011***		
								(-16.468)		
TED Spread								0.0051***		
								(16.176)		
Before (2,1)									0.0019	
									(0.665)	
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES
Lagged Equity Ratio	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,757	9,031	6,563	29,141	19,728	9,118	9,001	6,052	9,072	7,343
Adjusted R-squared	0.738	0.723	0.725	0.783	0.895	0.687	0.700	0.687	0.728	0.512

Panel C. Placebo Tests

Test	Placebo Tests: KNP Deregulation Falsified to:					Placebo Tests: KNP Deregulation Falsified to:					Random Assignments	
	1 Yr. Before Actual Deregulation	2 Yrs. Before Actual Deregulation	3 Yrs. Before Actual Deregulation	4 Yrs. Before Actual Deregulation	5 Yrs. Before Actual Deregulation	1 Yr. After Actual Deregulation	2 Yrs. After Actual Deregulation	3 Yrs. After Actual Deregulation	4 Yrs. After Actual Deregulation	5 Yrs. After Actual Deregulation	Random State Assignment into *KNP Index*	Random State Assignment into Deregulation Dates
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
Pseudo KNP Index	-0.0013	-0.0002	-0.0005	-0.0004	-0.0001	-0.0011	0.0010	0.0008	0.0010	-0.0004	-0.0002	0.0003
	(-0.970)	(-0.122)	(-0.343)	(-0.258)	(-0.050)	(-0.932)	(0.820)	(0.692)	(0.779)	(-0.303)	(-0.388)	(0.196)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.747	0.749	0.748	0.748	0.748	0.742	0.748	0.746	0.749	0.747	0.748	0.748

Panel D. Cross-Sectional Evidence

Criteria	Size		Return on Assets		Market-to-Book		Income Diversification		Asset Diversification		State Coincident Index Exposure	
Subsample	Small	Large	Low ROA	High ROA	Low MTB	High MTB	Low Income Diversification	High Income Diversification	Low Asset Diversification	High Asset Diversification	Low State Coincident Index	High State Coincident Index
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
KNP Index	-0.0009***	-0.0032***	-0.0024***	-0.0025***	-0.0023***	-0.0024***	-0.0025***	-0.0023***	-0.0034***	-0.0017***	-0.0018***	-0.0046***
	(-2.973)	(-9.494)	(-6.138)	(-5.690)	(-8.163)	(-5.058)	(-7.240)	(-5.357)	(-10.284)	(-6.435)	(-6.016)	(-4.319)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,545	4,527	4,528	4,544	4,527	4,545	4,644	4,428	4,541	4,531	4,505	4,486
Adjusted R-squared	0.769	0.663	0.662	0.473	0.812	0.396	0.508	0.530	0.5111	0.698	0.694	0.642

Criteria	Geographic Diversification Dummy		Geographic Diversification (1-HHI)		Fraction Out-of-State Deposits		Fraction Out-of-State Branches		Ln (Average Distance HDQ to Subs)		Active Acquirers or Not	
Subsample	Low (=0)	High (=1)	Low	High	Low	High	Low	High	Low	High	Active Acquirers	Other Banks
Column	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables												
R&S Index	-0.0014***	-0.0024***	-0.0015***	-0.0027***	-0.0014***	-0.0028***	-0.0014***	-0.0028***	-0.0014***	-0.0028***	-0.0031***	-0.0014***
	(-3.8624)	(-6.6965)	(-3.9306)	(-7.1613)	(-3.9712)	(-7.5187)	(-3.8967)	(-7.4446)	(-3.8967)	(-7.4446)	(-6.505)	(-5.651)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	5,448	3,624	5,482	3,590	5,444	3,628	5,439	3,633	5,439	3,633	3,374	5,698
Adjusted R-squared	0.6154	0.6222	0.6239	0.6585	0.6278	0.6672	0.6236	0.6638	0.6236	0.6638	0.643	0.754

Table A2. Geographic Deregulation and Target Capital: Potential Channels using *KNP Index*

This table reports the regression estimates for analyzing the effects of geographic deregulation on bank target capital with additional interactions for potential channels. geographic deregulation is proxied by *KNP Index*. We estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets. We treat the channel characteristics as endogenous and employ all valid lags of these variables as instruments in the regressions. To be able to interpret the relative magnitudes, we demean and rescale the characteristics by their standard deviation. Panel A reports results using interactions with the capital structure determinants (*Market-to-Book, Retail Deposits, Business Loans, Off-Balance-Sheet, ROA, StdvROA, Cost Efficiency, M&A,* and *Ln(Assets)*) as proxies for the channels. Panel B reports results using interactions with alternative proxies for the channels (*Number of Branches*, *State Presence, Metropolitan Area, Cost of Funding, Expected Default Frequency, Stock Beta, Government Subsidy,* and *Institutional Ownership*). We estimate a partial adjustment model (Equation (3)) where the dependent variable is bank *Equity Ratio*, calculated as the ratio of bank equity capital to total (unweighted) assets. All models include early deregulation indices (*Intra* and *Inter*), bank fixed effects, and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Capital Structure Determinants as Proxies for the Channels using *KNP Index*

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables										
KNP Index × Market-to-Book	-0.0022***									-0.0018***
	(-8.518)									(-6.094)
KNP Index × Retail Deposits		0.0006***								-0.0003
		(3.578)								(-1.059)
KNP Index × Business Loans			-0.0018***							-0.0017***
			(-6.853)							(-5.534)
KNP Index × Off-Balance-Sheet				-0.0003***						0.0002
				(-2.770)						(1.273)
KNP Index × ROA					-0.0017***					-0.0005**
					(-9.574)					(-2.033)
KNP Index × StdvROA						0.0005***				0.0000
						(3.502)				(0.059)
KNP Index × Cost Efficiency							0.0011***			-0.0002
							(5.036)			(-0.976)
KNP Index × M&A								-0.0006***		-0.0003***
								(-6.210)		(-2.815)
KNP Index × Ln(Assets)									-0.0005***	0.0000
									(-2.957)	(0.103)
KNP Index	-0.0015***	-0.0029***	-0.0037***	-0.0029***	-0.0019***	-0.0027***	-0.0022***	-0.0025***	-0.0020***	-0.0024***
	(-2.666)	(-5.557)	(-6.621)	(-5.469)	(-3.653)	(-5.132)	(-4.035)	(-4.781)	(-3.622)	(-3.508)
Do-Nothing Capital	0.6430***	0.6366***	0.6337***	0.6405***	0.6441***	0.6431***	0.6461***	0.6468***	0.6349***	0.6389***
	(28.291)	(28.892)	(28.056)	(29.910)	(30.122)	(29.787)	(28.393)	(30.402)	(28.675)	(26.685)
Market-to-Book	0.0059***	-0.0005	-0.0005	-0.0003	-0.0002	-0.0004	-0.0004	-0.0003	-0.0003	0.0046**
	(3.767)	(-0.863)	(-0.833)	(-0.507)	(-0.338)	(-0.657)	(-0.642)	(-0.492)	(-0.622)	(2.357)
Cost Efficiency	0.0016**	0.0002	0.0012*	0.0017***	0.0015**	0.0019***	0.0016***	0.0016***	0.0016***	0.0019
	(2.528)	(0.150)	(1.914)	(2.740)	(2.382)	(2.988)	(2.621)	(2.736)	(2.589)	(1.432)
Retail Deposits	0.0015**	0.0020***	0.0076***	0.0017**	0.0015**	0.0018***	0.0016**	0.0017**	0.0016**	0.0068***
	(2.180)	(2.928)	(3.989)	(2.536)	(2.215)	(2.691)	(2.417)	(2.527)	(2.417)	(3.219)
Business Loans	0.0011***	0.0011***	0.0012***	0.0021***	0.0009**	0.0010***	0.0011***	0.0010***	0.0011***	0.0005
	(2.891)	(2.883)	(2.883)	(2.726)	(2.350)	(2.770)	(2.989)	(2.633)	(2.943)	(0.382)
ROA	0.0012***	0.0008**	0.0007*	0.0007*	0.0061***	0.0009**	0.0008*	0.0007**	0.0008**	0.0026
	(2.899)	(2.090)	(1.916)	(1.920)	(4.070)	(2.261)	(1.842)	(1.966)	(2.104)	(1.342)
StdvROA	-0.0005	-0.0004	-0.0004	-0.0005	-0.0007**	-0.0020*	-0.0005	-0.0004	-0.0005	-0.0005
	(-1.469)	(-1.283)	(-1.127)	(-1.459)	(-1.983)	(-1.884)	(-1.323)	(-1.351)	(-1.420)	(-0.430)
Off-Balance-Sheet	-0.0011**	-0.0013***	-0.0012**	-0.0013***	-0.0011**	-0.0014***	-0.0044***	-0.0012**	-0.0012***	-0.0005
	(-2.289)	(-2.741)	(-2.447)	(-2.694)	(-2.509)	(-3.048)	(-3.269)	(-2.483)	(-2.624)	(-0.312)
M&A	0.0011***	0.0011***	0.0010***	0.0011***	0.0011***	0.0011***	0.0011***	0.0026***	0.0011***	0.0017**
	(7.216)	(6.987)	(6.757)	(7.026)	(7.216)	(7.128)	(7.193)	(3.774)	(7.127)	(2.529)
Ln(Assets)	-0.0052***	-0.0047***	-0.0055***	-0.0050***	-0.0053***	-0.0053***	-0.0056***	-0.0048***	-0.0035**	-0.0057***
	(-5.391)	(-4.253)	(-5.011)	(-5.069)	(-5.696)	(-5.404)	(-5.769)	(-4.625)	(-2.374)	(-2.990)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.717	0.735	0.702	0.740	0.715	0.726	0.715	0.749	0.745	0.709

Panel B. Alternative Proxies for the Channels using *KNP Index*

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*	*Equity Ratio*
Independent Variables									
KNP Index × Number of Branches	-0.0011**								-0.0009***
	(-2.548)								(-11.022)
KNP Index × State Presence		-0.0018***							-0.0000
		(-3.878)							(-0.354)
KNP Index × Metropolitan Areas			-0.0038***						-0.0008***
			(-3.882)						(-5.519)
KNP Index × Cost of Funding				0.0002					-0.0005***
				(1.501)					(-8.769)
KNP Index × Expected Default Frequency					-0.0009***				-0.0005***
					(-4.196)				(-9.108)
KNP Index × Stock Beta						-0.0017***			0.0001
						(-5.796)			(1.264)
KNP Index × Government Subsidy							0.0013***		0.0007***
							(9.495)		(14.494)
KNP Index × Institutional Ownership								-0.0004	0.0002*
								(-0.930)	(1.782)
KNP Index	-0.0019***	-0.0014***	-0.0011**	-0.0014***	-0.0021***	-0.0021***	-0.0015***	-0.0006**	-0.0011***
	(-7.270)	(-4.837)	(-2.565)	(-6.694)	(-9.749)	(-9.826)	(-7.216)	(-2.453)	(-20.381)
Number of Branches	0.0003								0.0018***
	(0.460)								(8.357)
State Presence		0.0106***							0.0015***
		(4.447)							(5.592)
Metropolitan Areas			0.0144***						0.0024***
			(2.972)						(4.588)
Cost of Funding				-0.0028***					0.0010***
				(-4.940)					(5.089)
Expected Default Frequency					0.0029***				0.0016***
					(4.184)				(8.261)
Stock Beta						0.0059***			0.0009***
						(5.100)			(2.736)
Government Subsidy							-0.0057***		-0.0030***
							(-9.485)		(-18.054)
Institutional Ownership								0.0105***	0.0025***
								(8.040)	(8.595)
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES
Do-Nothing Capital	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Bank Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	8,816	9,023	8,901	7,544	7,363
Adjusted R-squared	0.707	0.663	0.670	0.752	0.742	0.731	0.759	0.668	0.779

Table A3. Geographic Deregulation and Adjustment Speeds: Additional Robustness Tests using *KNP Index*

This table reports the regression estimates from additional robustness tests for analyzing the effects of geographic deregulation on bank capital adjustment speed using *KNP Index*. First, we estimate Equation (3) using system GMM and extract an estimate of target capital ratio according to Equation (4), which uses Equation (1) and the predicted values from Equation (3). Next, we substitute the estimated deviation from the target capital ratio obtained from Equation (5) into the partial adjustment Equation (7) to produce estimates of the determinants of bank adjustment speeds, as in Equation (8).

Panel A Columns (1) – (2) reports the regression estimates for analyzing the effects of geographic deregulation on capital adjustment speed using asymmetry based on bank capitalization: below target in Column (1) and above target in Column (2). The capitalization dummy is excluded from the estimation.

Panel B Column (1) reports regression estimates when we randomly assign states into deregulation dates, maintaining the original distribution. Column (2) presents regression estimates when we randomly assign states into deregulation dates with their corresponding deregulation index values. In Column (3), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Area)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's land area. Similarly, In Column (4), we instrument a bank's state *R&S Index* with its own lags and the *R&S Index of Neighbor States (Border)*, the weighted average of the *R&S Index* of neighbor or adjoining states, where the weights correspond to a given adjoining state's border length area.

Panel C reports additional robustness tests related to the sample composition and alternative explanations for *KNP Index*. Column (1) restricts the sample to banks that do not relocate their headquarters anytime during the sample period. Column (2) excludes banks headquartered in South Dakota and Delaware since these states had changes in their laws that encouraged the entry of credit card banks shortly before removing branching restrictions. Column (3) excludes the recent financial crisis observations 2007-2009. Column (4) include both public and private banks, while Column (5) includes only private banks. In both columns, we include all controls from our main specification, except for *Market-to-Book*, which cannot be constructed for private banks. Column (6) replaces *KNP Index* with the change in *KNP Index*. Column (7) employs the fed funds rate and the TED spread as additional controls in our main specification to take into account the effects of the banking environment. Column (8) employs an additional control for the deregulation index in the main specification to control for parallel trends. *Before (2,1)* is a dummy variable that equals one if the year is within two years prior to the interstate bank branching deregulation in the state of the bank (Krishnan, Nandy, and Puri, 2014). This variable captures the difference in the capital target for banks between the two years prior to deregulation in a state of a bank and the years prior to two years before the deregulation. Column (9) tests for mechanical mean reversion by eliminating banks with extreme capital ratio observations (greater than 90th or less than 10th percentiles of the distribution).

Panel D report results when controlling for additional stakeholder pressures for *KNP Index*. We include pressures from the regulators proxied by the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter and Federal Reserve district fixed effects in Column (1); pressures from the regulators proxied by a dummy equal to one if the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter is greater than zero, and Federal Reserve district fixed effects in Column (2); pressures from shareholders proxied by institutional ownership, the ratio of institutional shareholdings to bank outstanding shares in Column (3); pressures from debtholders proxied by the ratio of subordinated debt to total assets in Column (4); pressures from depositors proxied by the ratio of uninsured deposits to total deposits in Column (5); pressures from shareholders, debtholders, and depositors in the same regression in Column (6); all types of pressures when pressures from the regulators are proxied by the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter and Federal Reserve district fixed effects in Column (7); and all types of pressures when pressures from the regulators are proxied by a dummy equal to one if the number of corrective actions against the bank or its management by the corresponding banking regulator (FED, FDIC, or OCC) during the quarter is greater than zero, and Federal Reserve district fixed effects in Column (8).

For all panels, the dependent variable is the actively managed capital ratio change (difference between *Equity Ratio* and *Do-Nothing Capital*). The key explanatory variables are the interactions of the estimated deviation with *KNP Index*. Bank characteristics are: *Undercapitalized* is a dummy variable equal to one if the bank capital ratio lies below its target level; *Junk* is a dummy variable equal to one if bond rating is lower than BBB-; *BBB* is a dummy variable equal to one if bond rating is than BBB. *Missing Rating* is a dummy variable equal to one if bond rating is missing; *GDP Growth* is the annual GDP growth; *Inflation* is the annual inflation. All models include early deregulation indices (*Intra* and *Inter*) and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. Standard errors are bootstrapped to account for the generated regressor (Pagan, 1984; Faulkender, Flannery, Hankins, and Smith, 2012). *t*-statistics based on standard errors that are clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Asymmetry Based on Capitalization

	Asymmetry Based on Capitalization	
Subsample	Below Target Capital	Above Target Capital
Column	(1)	(2)
Dependent Variable	Δk	Δk
Independent Variables		
R&S Index	-0.0316***	-0.0178***
	(-7.463)	(-3.021)
Constant	YES	YES
Early Deregulation Indices	YES	YES
Other Bank Controls	YES	YES
Year Fixed Effects	YES	YES
Observations	5,791	3,281
Adjusted R-squared	0.513	0.324

Panel B. Placebo Tests

	Placebo Tests: Random Assignment		Endogeneity Tests	
Test	Random State Assignment into *R&S Index*	Random State Assignment into Deregulation Dates	Using R&S of Neighbor States (Area) as Instrument	Using R&S of Neighbor States (Border) as Instrument
Column	(1)	(2)	(3)	(4)
Dependent Variable	Δk	Δk	Δk	Δk
Independent Variables				
Placebo R&S Index	0.0021	-0.0015	-0.0291***	-0.0405***
	(0.610)	(-0.460)	(-8.684)	(-13.530)
Constant	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Observations	9,072	9,072	9,072	8,759
Adjusted R-squared	0.272	0.272	0.355	0.344

Panel C. Sample Composition and Alternative Explanations

	Sample Composition: Exclude or Include Certain Observations					Alternative Explanations			
Test	Exclude Banks with HDQ Relocations	Exclude South Dakota and Delaware	Exclude Crisis Observations	Include Both Public and Private Banks	Include Private Banks Only	Replace *KNP Index* with the Change in *KNP Index*	Add Banking Environment Controls	Add Control for Parallel Trends	Test for Mechanical Mean Reversion
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables									
KNP Index	-0.0181***	-0.0224***	-0.0342***	-0.0238***	-0.0202***	-0.0165**	-0.0100***	-0.0265***	-0.0260***
	(-3.263)	(-4.559)	(-5.036)	(-7.685)	(-5.641)	(-2.351)	(-2.587)	(-3.672)	(-4.427)
Fed Fund Rate							-0.0113***		
							(-3.618)		
TED Spread							0.0786***		
							(5.581)		
Before (2,1)								0.0392	
								(1.499)	
Constant	YES	YES	YES	YES	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	8,757	9,030	6,563	29,141	19,728	8,427	6,052	9,072	7,304
Adjusted R-squared	0.421	0.461	0.535	0.384	0.339	0.429	0.464	0.457	0.585

Panel D. Control for Additional Stakeholder Pressures

Test	Add Control for Regulatory Pressures	Add Control for Regulatory Pressures	Add Control for Shareholder Pressures	Add Control for Debtholder Pressures	Add Control for Depositor Pressures	Add Control for Stakeholder Pressures	Add Control for Stakeholder Pressures	Add Control for Stakeholder Pressures
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables								
KNP Index	-0.0296***	-0.0297***	-0.0223***	-0.0284***	-0.0289***	-0.0218***	-0.0219***	-0.0220***
	(-9.322)	(-9.365)	(-6.483)	(-9.144)	(-9.145)	(-6.178)	(-6.053)	(-6.098)
Pressures from Regulators: Number of Enforcement Actions	0.0003						-0.0009	-0.0237*
	(0.208)						(-0.636)	(-1.825)
Pressures from Regulators: Enforcement Actions Dummy		-0.0134						
		(-1.155)						
Pressures from Shareholders: Institutional Ownership			0.2385***			0.2391***	0.2436***	0.2445***
			(11.425)			(11.250)	(11.356)	(11.413)
Pressures from Debtholders: Subordinated Debt				0.7629*		0.3239	0.3649	0.4161
				(1.676)		(0.584)	(0.655)	(0.747)
Pressures from Depositors: Uninsured Deposits					0.0005	-0.0062	-0.0069	-0.0083
					(0.035)	(-0.438)	(-0.484)	(-0.584)
Constant	YES	YES	YES	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES	YES
Other Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Fed District Fixed Effects	NO	NO	NO	NO	NO	NO	YES	YES
Observations	9,072	9,072	7,544	9,072	8,507	7,062	7,062	7,062
Adjusted R-squared	0.480	0.480	0.496	0.480	0.491	0.503	0.503	0.504

Table A4. Deregulation and Speed of Adjustment: Potential Channels using *KNP Index*

This table reports the regression estimates for analyzing the effects of competition on capital adjustment speed with additional interactions for potential channels using *KNP Index*. In the first stage, we estimate Equation (3) using system GMM and extract an estimate of target capital ratio using Equation (4) and the predicted values from Equation (3). In the second stage, we substitute the estimated deviation from the target capital ratio obtained using Equation (5) into the partial adjustment Equation (7) to produce estimates of the determinants of bank adjustment speeds. This second step involves a pooled ordinary least squares (OLS) regression of the dependent variable (actively managed capital ratio change as measured by the difference between *Equity Ratio* and *Do-Nothing Capital*) on a set of variables defined as the product of estimated deviation and the covariates affecting the adjustment speed, as in Equation (8). This table reports results using interactions with the adjustment speed determinants (*Undercapitalized, Junk, BBB, Missing Rating, GDP Growth, Inflation*) as proxies for the channels. To be able to interpret the relative magnitudes, we demean and rescale the characteristics by their standard deviation. All models include early deregulation indices (*Intra* and *Inter*) and year fixed effects. The details of definitions and measurements of all variables are reported in Table 1. Standard errors are bootstrapped to account for the generated regressor (Pagan, 1984; Faulkender, Flannery, Hankins, and Smith, 2012). *t*-statistics based on standard errors that clustered by banks are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	Δk	Δk	Δk	Δk	Δk	Δk	Δk
Independent Variables							
KNP Index × Undercapitalized	-0.0020						0.0019
	(-0.594)						(0.558)
KNP Index × Junk		0.0970					0.1108
		(0.818)					(0.938)
KNP Index × BBB			0.0065				0.0195**
			(1.037)				(2.550)
KNP Index × Missing Rating				0.0022			0.0128**
				(0.557)			(2.509)
KNP Index × GDP Growth					-0.0032*		0.0004
					(-1.953)		(0.380)
KNP Index × Inflation						-0.0091***	-0.0092***
						(-4.156)	(-3.810)
KNP Index	-0.0389***	-0.0408***	-0.0414***	-0.0413***	-0.0147***	-0.0238***	-0.0364***
	(-15.988)	(-22.511)	(-21.955)	(-11.867)	(-2.863)	(-4.675)	(-5.192)
Undercapitalized	-0.0104						-0.0195
	(-0.821)						(-1.528)
Junk		-0.2616					-0.2981
		(-0.444)					(-0.508)
BBB			-0.0356				-0.0664**
			(-1.570)				(-2.253)
Missing Rating				0.0197			-0.0256
				(1.254)			(-1.216)
GDP Growth					0.0164***		-0.0011
					(3.491)		(-0.259)
Inflation						0.0439***	0.0495***
						(5.205)	(5.287)
Constant	YES	YES	YES	YES	YES	YES	YES
Early Deregulation Indices	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES
Observations	9,072	9,072	9,072	9,072	9,072	9,072	9,072
Adjusted R-squared	0.478	0.287	0.286	0.286	0.466	0.288	0.286

Table A6. Gravity Deregulation Approach – "Zero" Stage and 1st stage Results

This table reports the regression estimates for the "zero stage" of the gravity deregulation model to construct a gravity deregulation instrumental variable and the subsequent 1st IV Stage results. Panel A reports the "zero stage" for projecting bank deposit share in expansion states and includes all possible pairs of banks and states over our sample period of 1986-2014. The dependent variable is the share of BHC deposits in a given state. *Ln(Distance in 100 miles)* is the natural logarithm of the straight-line distance between a bank's headquarters and the capital of an expansion state (in 100s of miles) based on zip addresses. *Ln(Population i / Population j)* is the population ratio between home and expansion states, *Ln(GDP i / GDP j) is* the GDP between home and expansion states, *Neighbor State is* an indicator for a neighbor state of the bank, *Home State* is an indicator for the bank home state. All regressions also include early deregulation indices for interstate and intrastate deregulation. The gravity model includes observations in which it is legally feasible based on the interstate bank branching laws for a BHC *b* with headquarters in state *i* to expand in state *j* at time *t*. Columns (1)-(2) report results based on fractional logistic regression models, while columns (3)-(4) report results using OLS models that additionally control for year fixed effects and state-pair fixed effects. Panel B reports the 1st stage results of the IV model that uses the one minus the Herfindahl index based on the projected deposit shares *(1-Predicted HHI)* as the instrument for a BHC's actual dispersion of deposits *(1-HHI)*. *t*-statistics are reported beneath the coefficient estimates. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

Panel A. Gravity Deregulation Approach – "Zero" Stage

	Stage 0: Results using a Gravity Deregulation Approach			
Model	Fractional Logistic Regression 1	Fractional Logistic Regression 2	OLS Regression 1	OLS Regression 2
Column	(1)	(2)	(3)	(4)
Dependent Variable	*Share*	*Share*	*Share*	*Share*
Independent Variables				
Ln(Distance in 100 miles)	-0.557***	-0.555***	-0.013***	-0.013***
	(-21.895)	(-21.817)	(-19.845)	(-19.852)
Ln(Population i / Population j)	-0.381***		-0.000***	
	(-32.047)		(-20.516)	
Ln(GDP i / GDP j)		-0.357***		-0.000***
		(-31.483)		(-20.687)
Neighbor State i,j	2.177***	2.187***	0.002***	0.002***
	(57.587)	(58.111)	(4.027)	(4.144)
Home State i	8.587***	8.594***		
	(190.755)	(191.599)		
Early Deregulation Indices	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	YES
State-Pair Fixed Effects	NO	NO	YES	NO
Observations	1,824,476	1,806,726	1,824,476	1,806,726
Adjusted R-squared	0.835	0.834	0.872	0.872

Panel B. Gravity Deregulation Approach – IV 1st Stage Results

	Stage 1: Results using a Gravity Deregulation Approach			
Model	Fractional Logistic Regression 1	Fractional Logistic Regression 2	OLS Regression 1	OLS Regression 2
Column	(1)	(2)	(3)	(4)
Dependent Variable	*1-HHI*	*1-HHI*	*1-HHI*	*1-HHI*
Independent Variables				
1-Predicted HHI	2.5675***	2.5442***	0.5331***	0.5330***
	(10.590)	(10.560)	(8.980)	(8.980)
Control Variables	YES	YES	YES	YES
H0: Underidentified Statistic	112.33***	111.70***	80.78***	80.74***
H0: Weakly Identified Statistic	112.16***	111.53***	80.65***	80.62***