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THE COSTS AND BENEFITS OF BANKING DEREGULATION

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The Costs and Benefits of Banking Deregulation

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Abstract

Seven years after the passage of the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank"), the political environment has shifted the focus toward deregulation. Almost any deregulatory action would increase the scope of banks' operations by construction. This, in turn, would increase their number of counterparties—or increase the magnitude of exposures with existing counterparties—which would result in greater interconnectedness of the banking system. What are the costs and benefits of such a deregulatory pivot? This article attempts to answer this question by drawing on lessons from episodes of state-level banking deregulation in the United States during the late twentieth century. The analysis shows that expanded operations and increased interconnectedness lead to a potential trade-off between increased local growth and lower regional volatility on one side of the scale, and greater systemic fragility on the other. Policymakers should internalize this trade-off as they modify or eliminate existing regulations promulgated since Dodd-Frank.

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I. Introduction and Brief Historical Overview

Since the 2008 financial crisis, academics, policymakers, and politicians have focused intensely on financial regulation. During and after the passage of the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank"), they have debated liquidity and capital requirements; moral hazard caused by institutions too big to fail; the impact of interconnectedness on systemic risk; and the consequences of executive compensation on excessive risk taking and inequality.[1] Given the promulgation of numerous regulatory rules since Dodd-Frank, and given the current political environment, the focus has shifted markedly to *deregulation*.[2] But what are the substantive costs and benefits of such a pivot?

By construction, deregulation would increase the scope of banks' operations in some facet. This, in turn, would increase their number of counterparties—or, at the very least, increase the magnitude of exposures with existing counterparties—which would lead to greater interconnectedness of the banking system. The question therefore becomes, what would happen if our banking sector were more expansive, if it were more interconnected? This article attempts to answer these questions by drawing on lessons from several episodes of banking deregulation in the United States during the late twentieth century. Specifically, the analysis shows that policymakers face a potential trade-off between increased local growth and lower regional volatility on one side of the scale, and greater systemic fragility on the other—the oft-speculated balancing act between growth and stability.[3]

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[1] *See, e.g.*, MORGAN RICKS, THE MONEY PROBLEM: RETHINKING FINANCIAL REGULATION (2016); BEN S. BERNANKE, THE COURAGE TO ACT: A MEMOIR OF A CRISIS AND ITS AFTERMATH (2015); TIMOTHY F. GEITHNER, STRESS TEST: REFLECTIONS ON FINANCIAL CRISES (2015); GARY B. GORTON, MISUNDERSTANDING FINANCIAL CRISES: WHY WE DON'T SEE THEM COMING (2012); SIMON JOHNSON & JAMES KWAK, 13 BANKERS: THE WALL STREET TAKEOVER AND THE NEXT FINANCIAL MELTDOWN (2011); GARY B. GORTON, SLAPPED BY THE INVISIBLE HAND: THE PANIC OF 2007 (2010).

[2] *See, e.g.*, Donald J. Trump, *Presidential Executive Order on Core Principles for Regulating the United States Financial System* (Feb. 3, 2017), Presidential Executive Order, *available at* https://www.whitehouse.gov/the-press-office/2017/02/03/presidential-executive-order-core-principles-regulating-united-states; Daniel K. Tarullo, *Departing Thoughts* (Apr. 4, 2017), Speech at The Woodrow Wilson School, Princeton University, *available at* https://www.federalreserve.gov/newsevents/speech/tarullo20170404a.htm; Barney Jopson, *FT Explainer: Dodd-Frank Picked To Pieces* (Mar. 13, 2017), Financial Times, *available at* https://www.ft.com/content/915666b6-f928-11e6-bd4e-68d53499ed71.

[3] *Cf.* Robert DeYoung, Douglas D. Evanoff & Philip Molyneux, *Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature*, 36 Journal of Financial Services Research 87, 87 (2009) ("Several robust themes emerge in the post-2000 literature. North American bank mergers are (or can be) efficiency improving, although the event-study literature presents a mixed picture regarding stockholder wealth creation. . . . There is robust

This introductory section lays the groundwork for the analysis by presenting a brief historical overview of geographic banking restrictions in the United States. It highlights the fact that banks began as partners of the government and were given monopoly rights over operations in their local communities. The state governments greatly benefited from the banks' monopoly positions by taxing their profits, and these taxes became a substantial share of states' total tax revenue in the 1800s. Over time, these monopolistic boundaries were eroded due, *inter alia*, innovation in banking technology and business strategy, shifts in voting power, global competition, and economic distress. This subsequently caused an unprecedented wave of bank mergers and acquisitions, both within states and across state lines.

Section II looks at banking expansion post deregulation and its impact on growth. In particular, it asks whether the removal of state-level geographic restrictions in the 1970s and 1980s contributed to an improvement in local economic growth. If so, which type of deregulation mattered, and through what channel did it affect the local economy? The analysis confirms the literature's finding that the removal of restrictions on geographic expansion by banks through mergers and acquisitions significantly increased local economic growth. But, whereas the literature focuses on intrastate deregulation, the analysis shows that the *first* instance of deregulation caused an increase in economic growth, *regardless* of whether it was the removal of within-state or across-state restrictions. In addition, the increase in economic growth was likely caused by the reduction in distance between banks and credit-constrained households and firms, which led to more loan issuances, as opposed to improved loan quality. Indeed, numerous empirical studies show that when borrowers are located closer to a bank's branch, they are more likely to receive a loan from that bank. The intuition behind this phenomenon is that proximity allows banks to collect soft information and leverage that into an advantage in lending; on the other hand, greater distance makes it more difficult for the bank to collect such information.

Section III then turns to the impact of increased interconnectedness by studying the effect of state-level banking deregulation on local economic volatility and systemic fragility. It puts forth evidence supporting two claims. First, the removal of geographic restrictions—particularly the removal interstate restrictions—during the 1980s improved regional stability. Second, this greater interconnectedness heightened systemic risk. This contributes to the literature by presenting evidence of the "knife-edge" property of interconnectedness that has been recently articulated by policymakers and economic theorists. That is, as long as the adverse shocks are sufficiently small—say, an idiosyncratic shock to an

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evidence linking high CEO compensation to merger activity and strong implications that deals can be motivated by the desire to obtain 'too-big-to-fail' statute and reap the associated subsidies.").

agricultural state—then interconnectedness enhances financial stability because the losses of a single distressed bank are passed onto a lager number of counterparties. The system is stabilized by virtue of every bank being able to absorb a small piece of the damage. However, if the adverse shocks are sufficiently large—for example, a simultaneous housing market collapse in multiple states—then weaker interconnections are more beneficial because the affected bank would bear most of the losses, thereby protecting the rest of the system against cascading defaults. In sum, the third section highlights an intuitive trade-off between regional and systemic stability caused by increased concentration and interconnectedness.

Section IV concludes with the implications of the empirical findings. It emphasizes the broad trade-off between growth and stability that policymakers should keep in mind. As they start down the path of tweaking—or eliminating—parts of Dodd-Frank, they must perform a delicate dance so as to not give away too much on systemic stability. For instance, it would make sense for policymakers to reinforce the need to keep higher capital requirements in place or institute rules that guard against sub-optimally high counterparty exposures.

A. The Early Republic

The origin story of banks is one of monopolies facilitating the financing of government operations. The Bank of England, formed in 1694, and early North American banks in Pennsylvania, Massachusetts, and New York were all established by acquiring government charters.[4] Thus, it is not surprising that the economic history literature offers a consensus explanation for why states initially chose to regulate banks: they wanted to increase tax revenue for public expenditures.[5] In other words, states regulated banks for public finance.

These studies typically begin by noting that the Constitution prevents states from issuing fiat money.[6] Article I, Section 8 of the Constitution expressly gives Congress the power "To coin Money, regulate the Value thereof, and of foreign Coin, and fix the Standard of Weights and Measures."[7] Article I, Section 10 lays out the prohibitions on state revenue sources: "No State shall enter into

[4] *See* Gary B. Gorton, *The History and Economics of Safe Assets* (Apr. 2016), NBER Working Paper 22210, *available a*t http://www.nber.org/papers/w22210; *see also* BRAY HAMMOND, BANKS AND POLITICS IN AMERICA FROM THE REVOLUTION TO THE CIVIL WAR (1991).

[5] States also supported the establishment of local banks in order to provide money, given the lack of specie. The increased money supply facilitated local economic transactions as well as tax collection. *See* CHRISTINE DESAN, MAKING MONEY: COIN, CURRENCY, AND THE COMING OF CAPITALISM (2014).

[6] *See, e.g.*, Randall S. Kroszner & Philip E. Strahan, *What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions*, 114 Q. J. ECON. 1437, 1439 (1999).

[7] U.S. Const. art. I, § 8.

any Treaty, Alliance, or Confederation; grant Letters of Marque and Reprisal; coin Money; emit Bills of Credit; make any Thing but gold and silver Coin a Tender in Payment of Debts; pass any Bill of Attainder, ex post facto Law, or Law impairing the Obligation of Contracts, or grant any Title of Nobility."[8] The inability to issue paper money was problematic for the states, because issuing fiat currency was an important source of public finance during the American Revolution.[9]

The states had a couple of alternative options to their currency regime. They could increase property taxes and poll taxes, but both were viewed as "cumbersome and unpopular."[10] The states eventually resolved this problem when they decided to generate tax revenues by regulating banks. The idea was that if states could not benefit from creating money, they would benefit from institutions that created money.

In order to enter the banking business, a prospective banker had to first obtain a charter from the state, which received a fee from the issuance of the charter. The state also had the ability to buy shares in the chartered bank as well as tax the bank's capital, dividends, deposits, and profits.[11] Certain state governments began this practice as early as the 1790s, first to offset traditional state taxes but then to finance a variety of public expenditures on education and transportation.[12] To appreciate the extent to which bank taxes played in financing state projects, consider the research of Sylla et al. (1987).[13] In the first half of the 19th century, the bank-related share of total state revenues averaged above 10 percent in a dozen states.[14] In the five-year period from 1836 to 1840, Massachusetts received over 82 percent of its tax revenue share from its banking sector. Thus, the name of the game for each state was to restrict competition and to earn (tax) monopoly rents.[15] As we will see later, some states took this

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[8] U.S. Const. art. I, § 10.

[9] *See* Richard Sylla, John B. Legler & John J. Wallis, *Banks and State Public Finance in the New Republic: The United States, 1790-1860*, 47 J. ECON. HIST. 391, 391 (1987) ("The money-issuing practices of American colonial and state governments were so widespread and popular that they have been described as a system of 'currency finance.'").

[10] *Id.* at 392.

[11] *See id.* at 393 ("Early American states turned the banks they chartered into instruments of state finance in two broadways—by investing in banks and by taxing them.").

[12] *Id.* at 402.

[13] *Id.* at 401.

[14] The states are: Massachusetts, Connecticut, Rhode Island, Maine, New Hampshire, New Jersey, Pennsylvania, Delaware, Maryland, North Carolina, South Caroline, and Georgia.

[15] *See* Edward J. Kane, *De Jure Interstate Banking: Why Only Now?*, 28 J. Money, Credit & Banking 141, 142-43 (1996) ("Early state restrictions on branch office locations were intended to outlaw the sleazy practice of choosing inaccessible office sites to deter customers from redeeming a free-wheeling institution's circulating banknotes. Beginning in the late nineteenth century, as natural barriers to outside competition began to recede, state legislatures installed statutory barriers that functioned as replacement turf protectors.").

restriction to the extreme and prevented banks from branching, that is, from operating multiple offices.[16] These states were called "unit banking states." In the same vein, states did not stand to gain anything from a bank chartered in another state, which led to the rise of interstate banking restrictions.

B. From Public Finance to Political Ideology

By the end of the 19th century, the motivation for maintaining geographic restrictions expanded beyond merely generating tax revenue for the states. It evolved into a battle of rural states, with their small community banks, against the urbanized states, with their large banks. The Jeffersonian and Jacksonian schools of political thought had given rise to a populist movement that was heavily agrarian in outlook,[17] and that movement reached its apex by the turn of the 20th century, "as the muckrakers were discovering that John D. Rockefeller and other trusts were controlling vast amalgamations of wealth."[18]

Federal government officials became opposed to branch expansions on populist anti-trust grounds. For instance, Charles G. Dawes, the Comptroller of the Currency under President William McKinley, believed that branch banking "would result in building up a money power which would crush the small banks out of existence."[19] Banks in rural areas were adamant on protecting their markets from the big bad bankers of the east. The rural banks had enjoyed near, if not complete, monopoly rights from the geographic regulations. They were not about to surrender that position, as their survival would have been jeopardized if they had to compete with large New York banks. Several bills were introduced in Congress between 1900 and 1902 to permit bank branching, and all of them failed due to political pressure from rural banks.[20] At the end of the 19th century, only five national banks and eighty-two state banks in the entire country had branches, and they only had a total of 119 branches.[21]

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[16] *See* Jerry W. Markham, *Banking Regulation: Its History and Future*, 4 N.C. Banking Inst. 221, 231-32 (2000) ("By 1895, branching was permitted in twenty states, but most branch banks were intra-city branches, and eight of those states later prohibited branching. By 1896, thirteen states prohibited branch banking and many other states considered the practice to be illegal.").

[17] *See id.* at 232 n. 64; *see also* Susan Hoffmann, POLITICS AND BANKING: IDEAS, PUBLIC POLICY, AND THE CREATION OF FINANCIAL INSTITUTION 189 (2001) ("Government that defines the terms of economic association permissible in the private realm . . . is not the limited government of Locke or of Jefferson and Jackson. . . . [E]ven as populists call for a broader role for the government in the economic sphere, they know that government can become the tool of particular interests.").

[18] Markharm, *supra* note 15, at 232.

[19] *Id.*

[20] *Id.*

[21] *Id.* (citing *First Nat'l Bank of Logan v. Walker Bank & Trust Co.*, 385 U.S. 252, 257 (1966)).

Over the next two decades, however, the economic conditions were favorable and large banks expanded wherever possible. By 1923, 91 national banks and 580 state banks had over 2,000 branches.[22] Unsurprisingly, the rural bank lobby struck back. Congress clamped down with the McFadden Act in 1927. The Act permitted national banks to create new branches in states under the same conditions as the state banks. This essentially allowed state legislators to dictate the rules of the game by demarcating the limits for both state banks and national banks. Moreover, the McFadden Act prohibited branching across state lines. Banks could only branch—if at all—within the state in which it had a founding charter. States made sure that large out-of-state banks would never compete with its local banks. Thus, the U.S. banking system became highly fragmented and specialized, as the majority of banks only catered to their local communities.

The back-and-forth between banks and legislators continued after the passage of the McFadden Act. Certain banks successfully worked around these restrictions by creating multibank holding companies. Instead of operating one bank that was severely limited in its ability to branch out, bankers created multibank holding companies that owned several banks in different locations. The scheme was ingenious because there was no need to branch. Each bank was effectively a branch of the umbrella holding company. The exploitation of this loophole did not last for long. Congress stepped in again, this time by passing the Douglas Amendment to the Bank Holding Act of 1956:

> [The Douglas Amendment] plugged this [multibank holding company] loophole by specifying that the Federal Reserve Board could not approve an application by a bank holding company (BHC) to acquire 5% or more of the voting shares of interest in all, or substantially all, of the aspects of any bank located outside of the holding company's home state. To avoid conflicts with states' rights, the Douglas Amendment allowed a BHC to acquire a bank located outside its home state provided the target banks state specifically allowed it.[23]

The Douglas Amendment provided every state with the option to exclude out-of-state banks or bank holding companies from buying or building a bank or branch in their state. Any instance of interstate branching had to be approved by both states involved in the transaction. Every state exercised the option.[24] Thus, states were in the business of fostering conditions for monopoly rents even in the middle of the 20th century.

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[22] *Id.* at 233.

[23] R. Glenn Hubbard & Darius Palia, *Executive Pay and Performance Evidence from the U.S. Banking Industry*, 39 J. FIN. ECON. 105, 109 (1995).

[24] Donald P. Morgan, Bertrand Rime & Philip E. Strahan, *Bank Integration and State Business Cycles*, 119 Q. J. ECON. 1555, 1559 (2004).

C. Deregulation in the Late 20th Century

In the 1970s, no states permitted interstate banking and many prohibited or restricted intrastate branching.[25] Within a decade, however, state legislatures began the process of removing within-state and across-state restriction on bank expansion. For instance, the interstate blockade empowered by the Douglas Amendment eventually showed signs of weakening. In 1978, Maine became the first state to open up its borders to other states in a quid pro quo fashion.[26] Alaska and New York followed in 1982, and then there was an avalanche.[27] By the passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, which repealed the Douglas Amendment, every state except for Hawaii had deregulated interstate banking. The Riegle-Neal Act permitted bank holding companies to acquire banks in any state and to merge its banking subsidiaries together.[28] It also resulted in the highest-ever five-year run of bank mergers in the history of the United States.[29]

Figure 1.1 below plots the aggregate number of states that had removed intrastate or interstate regulations from 1960 to 1999.[30] As one can see, a dozen states never had intrastate restrictions by the beginning of the 1960s.[31] In the time window shown in Figure 1.1, the first state to remove intrastate restrictions was Vermont in 1970, followed by Maryland in 1975, New York in 1976, New Jersey in 1977, and Virginia in 1978. The first state to remove its interstate restrictions was Maine, which did so in 1978. Following Maine's lead, Alaska and New York removed their interstate restrictions in 1982, and Connecticut and Massachusetts did likewise in 1983.[32]

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[25] Philip E. Strahan, *The Real Effects of U.S. Banking Deregulation*, Working Paper (Nov. 2002), *available at* https://research.stlouisfed.org/conferences/policyconf/papers/Strahan.pdf.

[26] *Id.*

[27] *Id.*

[28] Markham, *supra* note 15, at 248-49.

[29] DeYoung et al., *supra* note 3, at 97.

[30] Before World War II, several states and Washington, D.C., had already deregulated intrastate branching by allowing mergers and acquisitions of other banks within the state, so the area under the solid red line does not add up to all 50 states. By 1994, every state had deregulated intrastate branching except for Iowa, which followed suit in 1999.

[31] The states are: Alaska, Arizona, California, Delaware, District of Columbia, Idaho, Maryland, Nevada, North Carolina, Rhode Island, South Carolina, and South Dakota.

[32] Table A.1 in the Appendix provides the specific dates when states removed their interstate and intrastate regulations.

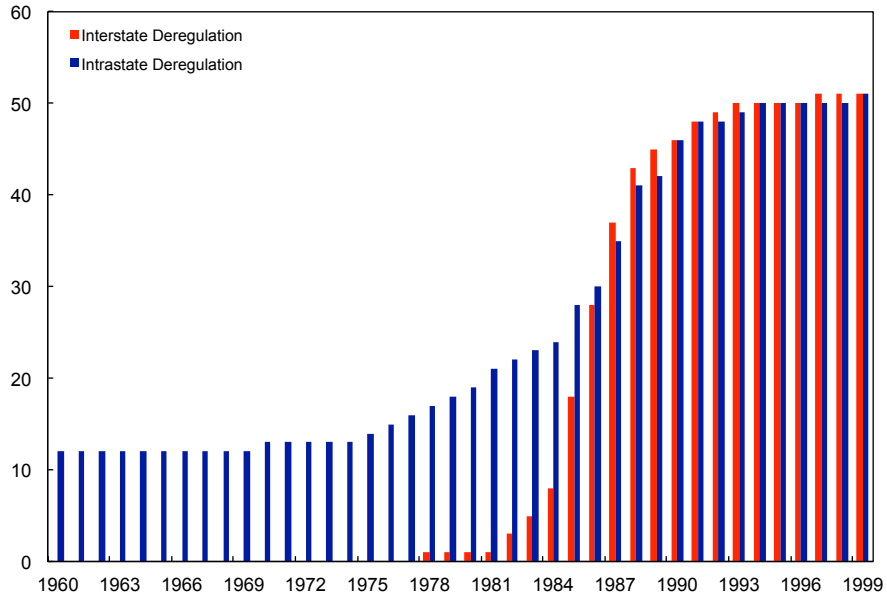

Figure 1.1: Number of States Without Interstate or Intrastate Restrictions

During this era, state legislatures also loosened restrictions on *de novo* branching, meaning banks could also expand by establishing a new branch in another location. However, few banking institutions expanded across state lines through *de novo* branching. Most interstate expansion occurred through cross-border mergers and acquisitions. The same was true for intrastate expansion—most expansion within states came through mergers and acquisitions, not *de novo* branching.[33] From the banks' perspective, it is much easier to expand by acquiring existing branches and taking advantage of their existing market share than paying the fixed cost to create a new branch and compete for a smaller share of the pie. Figure 1.2 below shows the number of unassisted commercial bank mergers in Alabama from 1970 through 1994. Alabama deregulated intrastate restrictions in 1981, and then deregulated interstate restrictions in 1987. Figure 1.2 depicts the spike and heightened volume of commercial bank mergers in 1981. Figure 1.3 tells the same story for Minnesota, which deregulated interstate restrictions first in 1986, then removed intrastate restrictions in 1993.

[33] *See* DeYoung et al., *supra* note 3, at 88 ("The changes in deregulation that followed allowed commercial banks and other financial services firms to expand—almost always via mergers and acquisitions (M&As)—into geographic markets and product markets that were previously off-limits."); *see also id.* at 97 ("Acquisition has been the preferred approach for U.S., European and Asian financial institutions to expand into new financial areas; it is faster than growing the new franchise internally and it delivers needed expertise and human capital not already present in the acquiring firm.").

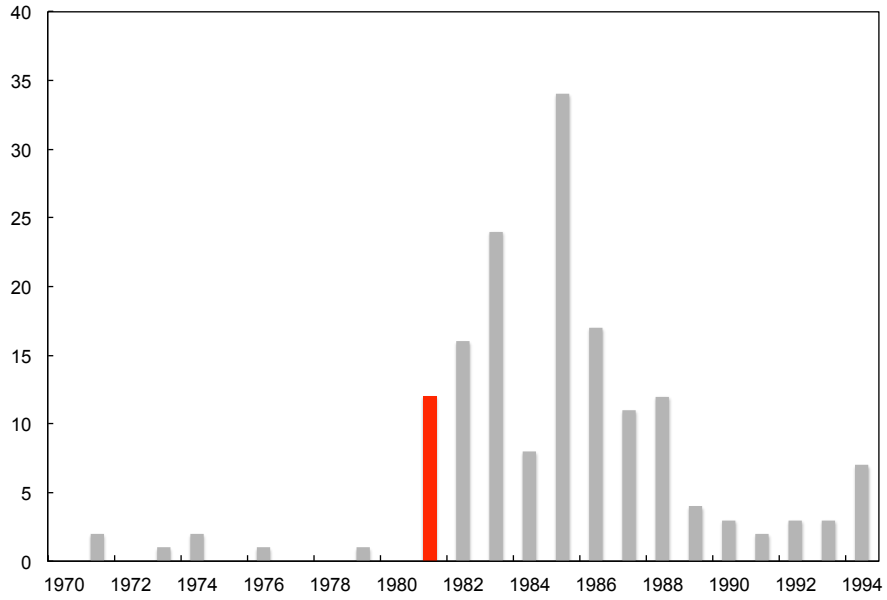

Figure 1.2: Number of Commercial Bank Mergers in Alabama

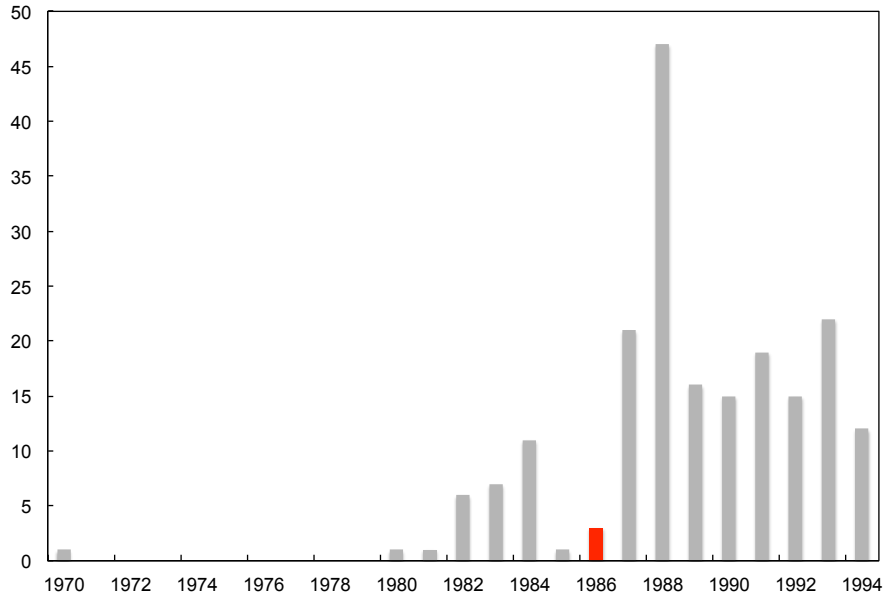

Figure 1.3: Number of Commercial Bank Mergers in Minnesota

The long history of public finance and political ideology begs the following question: Why did state and federal lawmakers eventually loosen geographic restrictions within and across states? Scholars have presented several hypotheses to explain the wave of deregulation that began the 1970s,[34] including

[34] *See, e.g.*, Kane, *supra* note 14; Kroszner & Strahan, *supra* note 5; Charles W. Calomiris & Stephen H. Haber, FRAGILE BY DESIGN: THE POLITICAL ORIGINS OF BANKING CRISES AND SCARCE CREDIT (2014).

innovations in banking technology and business strategy, shifts in voting power, global competition, and economic distress.

Technological advances changed the way in which banks could reach out to customers and also the way in which they did business generally. The automated teller machine (ATM), patented in 1974, significantly reduced the importance of branching for bank customers. A bank does not have to be physically located in a town to put an ATM there. Soon after ATMs came into use, lawyers representing the rural anti-deregulation camp filed lawsuits claiming that ATMs violated branching regulations. One of those cases made it up to the United States Court of Appeals for the Second Circuit, which held in 1985 that the use of an ATM did not constitute unauthorized branch banking under federal law.[35] When the United States Supreme Court denied certiorari,[36] it let the Second Circuit's decision stand, thereby eroding the economic value of continued geographic restrictions.

In line with the proliferation of faceless ATMs, the business of banking also became less personal. The traditional business model focused on constantly "expand[ing] their relationships by acquiring new customers."[37] During the 1980s, however, banks started selling products like cash management services, none of which required as significant of a personal relationship, or any personal relationship at all. Thus, geographic isolations no longer acted as a strict barrier to entry into a new market. Banks could generate revenue by simply presenting an offer for loan participations, stocks and bonds, advice on mergers and acquisitions, investments in commodity futures, etc.[38]

Another reason was demographic: a shift of voters away from rural areas toward cities.[39] The ratio of American citizens living in urban areas to those living in rural areas increased from 1.3:1 to 1.9:1 between 1940 and 1970. As discussed in the previous subsection, the rural anti-deregulation lobby was very strong. No community bank in a rural area wanted to give up its market share. Moreover, political ideology contributed to a deep mistrust of east coast (New York)

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[35] *See Independent Bankers Ass'n of New York State, Inc. v. Marine Midland Bank, N.A.*, 757 F.2d 452, 455 (2d Cir. 1985) ("The district court held that Marine's use of the ATM constituted unauthorized branch banking under applicable federal law. . . . For reasons stated below, we reverse on the federal claim.").

[36] *Independent Bankers Ass'n of New York State, Inc. v. Marine Midland Bank, N.A.*, 476 U.S. 1186 (1986).

[37] Markham, *supra* note 15, at 250.

[38] Markham, *supra* note 15, at 251-52.

[39] *See* Calomiris & Haber, *supra* note 33, at 195 ("As of 1900, 45.8 million Americans lived in rural areas, compared to 30.2 million in cities and towns with more than 2,500 inhabitants. By 1920 rural and urban populations were roughly equal, and by 1940 the number living in cities or towns had grown to 74.4 million, compared to 57.2 million rural inhabitants. After World War II, the urban population share took off: by 1970, 133.4 million Americans lived in locations with more than 2,500 inhabitants, compared to 69.8 million living in rural areas.").

bankers. Customers in those rural areas greatly preferred using a trusted local bank, even if that bank were poorly diversified. Once voting power started shifting away from rural areas, the lobbying force against the large banks naturally weakened.

A third reason involved the global market share of U.S. banks. Given the geographic constraints, U.S. banks were generally smaller than their global competitors. This issue came to the political forefront in the late 1980s and 1990s, when larger foreign banks started capturing greater market share in America. According to Calomiris and Haber, politicians, as well as the Federal Reserve, were calling for deregulation in order to increase the competitiveness of U.S. banks:

> [T]he Fed chairman Alan Greenspan called for the expansion of bank powers: "The ability of banks to continue to hold their positions by operating on the margins of customer services is limited. Existing constraints, in conjunction with the continued undermining of the bank franchise by the new technology, are likely to limit the future profitability of banking. . . . If the aforementioned trends continue, banking will contract either relatively or absolutely."[40]

Finally, scholars argue that banking distress during the era contributed to the interstate deregulation cascade in the 1990s.[41] Seeing small, poorly diversified banks fail in several states forced taxpayers (voters) and politicians to realize the importance of removing geographic restrictions. The rationale was that nobody wanted to bail out these banks, and diversification would strengthen the system. However, this hypothesis is not universally accepted, at least not with respect to intrastate deregulation. Kroszner and Strahan argue that banking distress did not affect the timing of intrastate deregulation.[42] Their main conclusion is that states with more potential winners (large banks and small firms) removed intrastate restrictions sooner than states with more potential losers (small banks).[43] Thus, their story is based on politics and not economic distress,[44] which is advantageous because it theoretically removes the endogeneity problem when testing whether deregulation affected economic conditions. Otherwise, the empirical tests would be subject to criticisms of reverse causation.

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[40] *Id.* at 197.

[41] *See* Kane, *supra* note 14, at142 ("High failure rates among geographically confined banks and S&Ls teach taxpayer-customers important lessons about the long-run dangers of doing business with underdiversified institutions, especially at a time when advancing financial technology is fusing financial markets across the nation and around the globe.").

[42] *See* Kroszner & Strahan, *supra* note 5, at 1454 ("We do not find a linkage between the timing of state deregulation and statewide banking distress.").

[43] *Id.* at 1437.

[44] *See also* Philip E. Strahan, *The Real Effects of U.S. Banking Deregulation*, St. Louis Fed at 6-7 (noting the political economy factors behind the deregulation movement).

In sum, banks began as partners of the government and were given monopoly rights over operating in their local communities. Over time, these monopolistic boundaries were eroded due, *inter alia*, innovations in banking technology and business strategy, shifts in voting power, global competition, and economic distress. This subsequently caused an unprecedented wave of bank mergers and acquisitions, both within state boundaries and across state lines. Although there is no uniform agreement on why states deregulated in the 1970s and 1980s, many of these hypotheses point to political and technological changes, rather than sudden changes in macroeconomic conditions, as the main factors behind the phenomenon.

II. Shortened Distance and Heightened Growth

Section II examines whether the removal of geographic restrictions on bank expansion in the 1970s and 1980s contributed to an improvement in real economic growth. If so, which type of deregulation mattered, and through what channel did it affect the local economy? Banking deregulation in this context refers to the elimination of restrictions on interstate and intrastate bank mergers and acquisitions. Deregulation of the former allowed banks to merge with or acquire banks across state lines. The latter type of deregulation allowed banks to merge with or acquire banks in their own states.

Economic theory offers several explanations for why the removal of geographic banking restrictions may affect local economic growth. For instance, the entry of additional banks into a previously insulated region may increase competition and the supply of loans. The greater availability of capital would benefit credit-constrained households and firms. Moreover, the diversification of idiosyncratic risk may increase the stability of local banks, thereby providing borrowers with more consistent access to capital, particularly alleviating firms' investment uncertainty. These suggest that deregulation could lead to an increase in loan provisions and investment following the removal of restrictions on bank mergers and acquisitions. Furthermore, greater integration and interactions with out-of-state banks could also lead to more efficient investment through better screening and monitoring of investors.[45]

The empirical analysis confirms the conjecture that state-level economic growth improved after deregulation. In particular, the panel regressions show that the growth rate of annual state-level GDP and the growth rate of monthly state-level employment increased significantly after the first instance of deregulation.

[45] There were no legal restrictions on lending across geographic boundaries. However, the literature has shown time and again that, all else equal, distance is an impediment to bank lending.

Conditional upon the first instance of deregulation occurring, the second instance—regardless of whether it was interstate or intrastate deregulation—did not provide as significant of a contribution to growth. Moreover, the panel regressions detect an increase in loan growth following deregulation. It is well established by the literature that one of the biggest hurdles to obtaining a loan is the distance between lender and borrower. The entry of a well-capitalized bank into an area would give that bank better control over monitoring potential borrowers, and this could lead to an increase in growth in an area that was previously credit constrained.

It is duly noted that some states deregulated when they were in the midst of an economic downturn, so it is expected that growth rates would naturally be higher in the years after the downturn. Thus, some of the positive growth effects attributed to deregulation is no more than spurious correlation—that is, they just happened to occur at the right time. Nevertheless, a more qualified version of the analysis still shows that states grew faster post-deregulation. Indeed, the analysis contains several robustness checks to account for the endogeneity concern of non-random deregulation timing. Those robustness checks show a positive growth effect, which is in line with the empirical findings by other authors.

A. Literature Review

The consensus in the literature is that banking deregulation had a positive impact on economic growth. The contribution of this section is showing that the first instance of deregulation mattered, regardless of whether it was intrastate or interstate deregulation. Moreover, the analysis shows that the increase in growth was likely not caused by higher quality loans but rather by increased loan volume.

Jayaratne and Strahan's seminal 1996 paper argues that the removal of intrastate restrictions on mergers and acquisitions caused an increase in local economic growth, as measured by state-level real per capita GDP and real per capita personal income.[46] Since Jayaratne and Strahan published their results, authors have used this deregulation quasi-natural experiment to investigate a host

[46] *See* Jith Jayaratne & Philip E. Strahan, *The Finance-Growth Nexus: Evidence from Bank Branch Deregulation*, 111 Q. J. ECON. 639, 667 (1996) ("We argue that changes in branching policy played an important role in the observed growth pickup. We find no other concurrent policy changes to explain the improved growth performance. Nor do we find any evidence that statewide branching was implemented in anticipation of future growth prospects."); *see also* Randall S. Kroszner & Philip E. Strahan, 101 American Economic Review: Papers & Proceedings 242, 243 (2011) ("In some cases, such as removal of geographic restrictions on bank expansion, financial sector reform has not involved a tradeoff and has result edin both higher growth and lower volatility."); Philip E. Strahan, *The Real Effects of U.S. Banking Deregulation*, Federal Reserve Bank of St. Louis Review 111, 111 (2003) ("State economies grew faster and had higher rates of new business formation after this deregulation. At the same time, macroeconomic stability improved.").

of issues.[47] For example, Morgan et al. analyze the impact of deregulation on economic volatility[48]; Ashcraft examines the effect of deregulation on the efficacy of monetary policy[49]; Cetorelli and Strahan analyze the impact of deregulation on increased banking competition and the growth of small businesses[50]; Demyanyk et al. study its effect on the interstate insurance of personal income[51]; Beck et al. look at its effect on income inequality[52]; and Tewari investigates its effect on the mortgage market.[53]

A common theme in many of these papers is the beneficial increase in bank competition post-deregulation. For example, Beck et al. examine the consequences of intrastate branching deregulation on income inequality.[54] The authors find that intrastate deregulation tightened the income distribution by increasing the incomes of workers in the lower end of the distribution while not having a significant effect on those in the upper end of the distribution. They further claim that the deregulation of intrastate branching broke down local monopolies, thereby improving access to credit for smaller firms. Indeed, their results show an added effect in states with previous unit banking restrictions, states with a higher proportion of small banks, and states with a higher proportion of small firms. In the same vein, a recent article by Krishnamurthy argues that deregulation improved local economic conditions, by augmenting local credit supply and small business growth.[55] The increased diversification of bank

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[47] *See generally* Allen N. Berger, Rebecca S. Demsetz & Philip E. Strahan, *The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Future*, 23 J. BANK. & FIN. 135, 135 (1999) ("The evidence is consistent with increases in market power from some types of consolidation; improvements in profit efficiency and diversification of risks, but little or not cost efficiency improvement on average; relatively little effect on the availability of services to small customers; potential improvements in payments system efficiency; and potential costs on the financial system from increases in systemic risk or expansion of the financial safety net.").

[48] *See* Donald P. Morgan, Bertrand Rime & Philip E. Strahan, *Bank Integration and State Business Cycles*, 119 Q. J. ECON. 1555 (2004).

[49] *See* Adam B. Ashcraft, *New Evidence on the Lending Channel*, 38 Journal of Money, Credit, and Banking 751 (2006).

[50] *See* Nicola Cetorelli & Philip E. Strahan, *Finance as a Barrier to Entry: Bank Competition and Industry Structure in Local U.S. Markets*, 61 J. FIN. 437 (2006).

[51] *See* Yuliya Demyanyk, Charlotte Ostergaard & Bent E. Sorensen, *U.S. Banking Deregulation, Small Businesses, and Interstate Insurance of Personal Income*, 62 J. FIN. 2763 (2007).

[52] *See* Thorsten Beck, Ross Levine & Alexey Levkov, *Big Bad Banks? The Winners and Losers from Bank Deregulation in the United States*, 65 J. FIN. 1637 (2010).

[53] *See* Ishani Tewari, *The Distributive Impacts of Financial Development: Evidence from Mortgage Markets during U.S. Branch Banking Deregulation*, 6 American Economic Journal: Applied Economics 175 (2014).

[54] Beck et al., *supra* note 73.

[55] Prasad Krishnamurthy, *Banking Deregulation, Local Credit Supply, and Small-Business Growth*, 58 J. L. & ECON. 935 (2015).

deposits within and across state lines effectively insured small businesses against local shocks to credit supply.

The state-level panel regressions in the subsequent analysis confirm the main empirical result of Jayaratne and Strahan,[56] namely, state-level economic growth increased following the deregulation of intrastate mergers and acquisitions. In addition, they provide evidence for a slightly stronger conclusion: economic growth increased after the *first* instance of deregulation, regardless of whether it was intrastate or interstate, though it is certainly true that intrastate deregulation had the larger impact—simply because there were many more intrastate mergers and acquisitions than interstate ones. The following analysis also differs in the hypothesized causal mechanism. Jayaratne and Strahan find improvements in loan quality but no significant increase in lending after the deregulation of intrastate restrictions. They therefore conclude that lending efficiency was the driver of the growth increases, as opposed to increased availability of credit.[57]

The following empirical analysis finds the opposite—that is, it presents evidence of significant increases in credit availability following the first instance of deregulation but no increase in quality of the loans. This is consistent with the literature on banking and distance, because one aspect of financial intermediation is evaluating a prospective borrower in person and monitoring him after the loan has been made. This is why banks extend credit to borrowers by opening up a checking account instead of distributing cash.[58] Thus, it is unsurprising to find that any instance of potentially reducing distance would affect economic growth. A bank will disperse more loans once it has a physical presence in a geographic area.

In the historical episode under study, banks were allowed to extend loans across geographic boundaries. There were no laws against lending, only laws against expansion. However, the importance of distance and monitoring costs imply that well-capitalized banks did not lend to households and firms several states away. And if the local banks could not extend a loan—either because they did not have the resources or were on the brink of default—then the local households and firms were out of luck. Once stronger banks moved into the local area through mergers or acquisitions, they were in closer proximity and had the resources to provide loanable funds. In sum, the story is one of deregulation

[56] Jayaratne and Straha, *supra* note 67.

[57] *Id.* at 667.

[58] *See* Morgan Ricks, THE MONEY PROBLEM: RETHINKING FINANCIAL REGULATION (2016); *see also* Michael McLeay, Amar Radia & Ryland Thomas, *Money Creation in the Modern Economy*, Bank of England Quarterly Bulletin (2014).

improving economic growth by allowing borrowers and lenders to overcome the transaction costs of financial intermediation.

B. Main Empirical Results

The empirical analysis utilizes deregulation indicators constructed from the dates of intrastate or interstate deregulation.[59] Figure 2.1 shows the timing of deregulation in 39 states, with deregulation defined as the first instance of deregulation, regardless of whether it was intrastate or interstate.

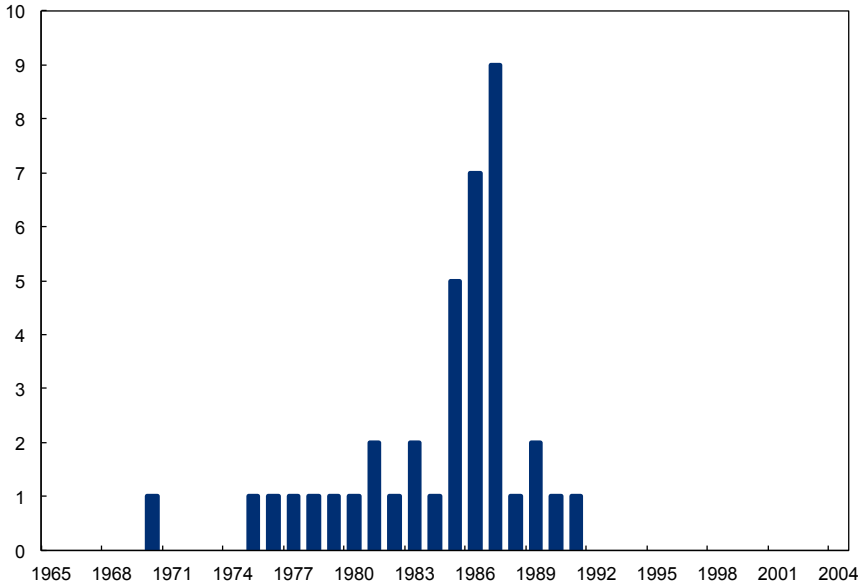

Figure 2.1: First Instance of Deregulation in a State

To measure economic growth for each state, the following regressions utilize the 12-month change in state-level employment, the four-quarter change and the annual change in state-level real personal income, and the annual change in state-level real GDP. The first data series comes from the Bureau of Labor Statistics, and the remaining series are from the Bureau of Economic Analysis. Note that only nominal personal income is provided at the state level. To convert the quarterly series into real personal income, the analysis uses the national personal consumption expenditures price index; when converting the annual nominal personal income data, the analysis uses the state-level GDP deflator, which is calculated from the nominal and real state-level GDP values.

The empirical results are derived from panel regressions that exploit the differences in deregulation timing across states. The general form of the econometric specification is:

[59] *See* Appendix for details.

$$Growth_{i,t} = a_i + a_t + a_{i,t} + \beta \times Deregulation_{i,t} + \varepsilon_{i,t}$$

where the dependent variable is real GDP growth, real personal income growth, or employment growth in state i at time t; a_i corresponds to state fixed effects, which capture idiosyncratic features of state i that remain constant over time; a_t corresponds to time fixed effects, which control for changes in the aggregate environment during time t; $a_{i,t}$ controls for state-specific time trends in the dependent variable; $Deregulation_{i,t}$ corresponds to an indicator that equals "0" if state i has both intrastate and interstate restrictions in place at time t and equal to "1" if state i has removed either of the two at time t. The estimated coefficient of interest is β.[60]

It is worth emphasizing once more that the econometric specification exploits the differences in deregulation timing across states. This means that it takes into account—theoretically eliminates—effects from changes that occurred in all states simultaneously. For instance, changes in federal tax policy or technological innovations in finance are captured by the time fixed effects and weeded out, assuming they affected all states at the same time. Similarly, characteristics of individual states are accounted for by the state fixed effects.

Finally, note that the subsequent regressions follow the lead of Beck et al., who argue that it is better to exclude the states that deregulated before the modern era.[61] The $Deregulation_{i,t}$ indicator never changes from "0" to "1" in over a dozen states because they removed intrastate branching restrictions before the 1960s. They are not used in the regressions because the control group should comprise of states that have not yet deregulated in any form. This way, the comparison shows the average treatment effect of deregulation relative to states with restrictions in place.

Tables 2.1, 2.2, and 2.3 below contain the main results. Table 2.1 first shows the impact of the first instance of deregulation on state-level economic growth, as measured by annual GDP, quarterly personal income, and monthly employment. Post-deregulation, the average rate of GDP and employment growth in the deregulating states increased by over 1 percentage point relative to the average rate in states with restrictions. The lack of movement in the personal income series is surprising, however, because it is usually highly correlated with real economic activity. Notably, this is in line with the empirical findings by

[60] All of the state-level panel regressions in the subsequent analysis employ clustered standard errors following Marianne Bertrand, Esther Duflo & Sendhil Mullainathan, *How Much Should We Trust Differences-In-Differences Estimates?*, 119 Q. J. ECON. 249 (2014).

[61] *See* Beck et al., *supra* note 73.

Huang, who use county-level regression discontinuities to demonstrate that the growth in personal income was relatively limited.[62]

Table 2.1: First Instance of Deregulation and Growth

Variables	GDP Growth	PI Growth	EMP Growth
Deregulation	0.0158***	-0.0019	0.0139***
	(0.0049)	(0.004)	(0.0039)
State F.E.	Y	Y	Y
Year F.E.	Y	Y	Y
State Trends	Y	Y	Y
States	35	35	35
Years	1978-94	1978-94	1978-94
Observations	595	2380	7140
R-squared	0.5274	0.3348	0.6061

Table 2.2 contains evidence suggesting that the first instance of deregulation explains more of the variation in growth than intrastate deregulation by itself. Column (1) shows that, when paired with intrastate deregulation, the coefficient on the first instance of deregulation is still significant and positive, albeit weaker. The same is true for employment growth in column (3). Notably, the literature has thus far focused primarily on the impact of intrastate deregulation, which is understandable given the fact that most mergers and acquisitions occurred within state lines. But the economic theory—regardless of whether the conjectured mechanism is fiercer competition, the mitigation of shocks to local credit supply, or minimized distance between borrower and lender—suggests that gains should not be limited only to expansion within state borders. Such benefits can also be accrued via expansion across state lines.

Table 2.2: Intrastate Deregulation v. First Instance

Variables	GDP Growth	PI Growth	EMP Growth
Deregulation	0.0104**	-0.0061	0.0097**

[62] *See* Rocco Huang, *The Real Effect of Bank Branching Deregulation: Comparing Contiguous Countries across U.S. State Borders*, 87 J. FIN. ECON. 678 (2008).

	(0.0041)	(0.0049)	(0.004)
Intrastate	0.0086	0.0067*	0.0067
	(0.0053)	(0.0035)	(0.0051)
State F.E.	Y	Y	Y
Year F.E.	Y	Y	Y
State Trends	Y	Y	Y
States	35	35	35
Years	1978-94	1978-94	1978-94
Observations	595	2380	7140
R-squared	0.5304	0.3370	0.6087

Unsurprisingly, the same pattern holds when the first instance of deregulation is pitted against interstate deregulation. The results are presented in Table 2.3 below.

Table 2.3: Interstate Deregulation v. First Instance

Variables	GDP Growth	PI Growth	EMP Growth
Deregulation	0.0119***	-0.003	0.0115***
	(0.0044)	(0.0042)	(0.0036)
Interstate	0.008	0.0024	0.005
	(0.0048)	(0.0046)	(0.0035)
State F.E.	Y	Y	Y
Year F.E.	Y	Y	Y
State Trends	Y	Y	Y
States	35	35	35
Years	1978-94	1978-94	1978-94
Observations	595	2380	7140
R-squared	0.5300	0.3351	0.6075

The remainder of this section analyzes three factors that may bias the estimated coefficient: non-random deregulation timing, high population growth, and rich natural resources. Figure 2.1 in the beginning of this section shows very

clearly that a substantial number of states eliminated one form of their geographic restrictions in 1985, 1986, or 1987. The vast majority of those economic downturns occurred in the 1980s. For instance, consider when the oil states and the farm states deregulated. Texas was experiencing an oil crisis, and the farm states had an agricultural problem. Banks in those oil states and the agricultural states would have gone under. One should skeptically ask: Is it any wonder that there was higher growth after? The main concern is that all those states were about to experience a bounce back in economic conditions, possibly because they just exited a recessionary period. That would create the illusion that banking deregulation was causing the upswing in economic growth, when it was simply along for the ride.

Admittedly, the state-level panel regressions cannot perfectly control for such endogeneity. But that does not mean the results are void. To show that the effects of first-time deregulation are still valid, the following tables contain results of three robustness checks for GDP growth and employment growth. In columns (1) and (3) of Tables 2.4, the regressions omit the states that deregulated in 1985, 1986, and 1987 from the estimation sample, which is why the number of states declines from 35 to 14. As one can see, the estimated coefficient is still significant and its magnitude remains in the same neighborhood. Similarly, columns (2) and (4) address this problem from another angel by removing all observations within a two-year window of the deregulation date. The objective is to control for the immediate pre-recession dip and post-recession recovery. The main result survives these two tests.

Table 2.4: Accounting for Potential Non-Random Timing

Variables	GDP Growth	GDP Growth	EMP Growth	EMP Growth
Deregulation	0.0209**	0.0245***	0.0116**	0.0221**
	(0.0074)	(0.0089)	(0.0049)	(0.0084)
State F.E.	Y	Y	Y	Y
Year F.E.	Y	Y	Y	Y
State Trends	Y	Y	Y	Y
States	14	35	14	35
Years	1978-94	1978-94	1978-94	1978-94
Observations	238	423	2856	5076
R-squared	0.6254	0.5935	0.7424	0.6745

In addition to the endogenous timing of deregulation, another factor that could bias the result upward is population growth. Perhaps deregulating states happened to be those states that experienced higher than average population growth, which would independently increase economic output and employment. However, the data suggest otherwise. Column (1) of Table 2.5 controls for population growth by using per capita GDP growth instead of GDP growth. The estimated effect of deregulation is more or less unchanged. Columns (2) and (3) remove the states with population growth rates of over 15 percent in the 1980s. In total, seven states are dropped from the estimation sample, but the result remains the same. It does not appear likely that population growth is biasing the result upward.

Table 2.5: Controlling for Population Growth

Variables	Per Capita GDP Growth	GDP Growth	EMP Growth
Deregulation	0.0139***	0.0154***	0.0153***
	(0.0044)	(0.0048)	(0.0043)
State F.E.	Y	Y	Y
Year F.E.	Y	Y	Y
State Trends	Y	Y	Y
States	35	28	28
Years	1978-94	1978-94	1978-94
Observations	595	476	5712
R-squared	0.5480	0.5355	0.6047

Last, but not least, Table 2.6 checks to see if the results are disproportionately affected by states with natural resources, namely, oil. The regressions in Table 2.6 drop the states with the highest amount of oil production in the 1980s. Specifically, the regressions discard the few states that had an average of at least 100,000 barrels of crude oil production per day. The results are less significant, but the overall story remains intact: the first instance of deregulation, regardless of its type, caused economic changes at the state level.

Table 2.6: Natural Resources[63]

Variables	GDP Growth	EMP Growth
Deregulation	0.0114**	0.0081*
	(0.0042)	(0.0041)
State F.E.	Y	Y
Year F.E.	Y	Y
State Trends	Y	Y
States	28	28
Years	1978-94	1978-94
Observations	476	5712
R-squared	0.5705	0.7181

C. Distance and Lending

Before the deregulatory era, many regions had smaller, isolated banks that could not provide a stable amount of credit to households or firms who wished to borrow.[64] One may legitimately ask: Why did larger banks not lend to those borrowers? Indeed, there was no prohibition on lending across geographic boundaries. The answer involves monitoring costs associated with distance between the lender and the borrower. Distance matters.

The seminal 2002 study by Petersen and Rajan highlights the role of information and distance for small businesses seeking loans.[65] While technological progress has done much to break the "tyranny of distance,"[66] the impact of distance is still felt by the average prospective borrower. Recent studies find that when firms are located closer to a bank's branch, they are more likely to

[63] The crude oil production data are from the U.S. Energy Information Administration (EIA). These regressions drop the states with substantial oil resources, defined by the author as states that produced at least 100,000 barrels of crude oil per day in the 1980s. The states are Texas, Louisiana, Oklahoma, Wyoming, New Mexico, Kansas, and North Dakota.

[64] *See* Howard D. Crosse, *Banking Structure and Competition*, 20 J. FIN. 349, 352 (1965) (noting that the small community banks could not keep up with a growing economy); *see also* Philip E. Strahan, *The Real Effects of U.S. Banking Deregulation*, St Louis Fed at 24 ("Banking deregulation of restrictions on branching and interstate banking lifted a set of constrains that had prevented better-run banks from gaining ground over their less efficient rivals.").

[65] *See* Mitchell A. Petersen & Raghuram G. Rajan, *Does Distance Still Matter? The Information Revolution in Small Business Lending*, 57 J. FIN. 2533 (2002).

[66] *Id.* at 2535.

receive a loan from that bank.[67] The intuition behind this phenomenon is that proximity allows banks to collect soft information and leverage that into an advantage in lending; and distance makes it more difficult for the bank to collect such information.[68]

Simply consider the way in which banks lend. In introductory economics courses, students are typically taught that a bank first waits for a person to deposit his or her savings; and once a borrower comes along, the bank loans out the money. In reality, when the bank lends—say, to a small business—it simultaneously creates a matching deposit in the borrower's bank account.[69] This allows the bank to better monitor the inflows and outflows of capital.[70] And having more branches facilitates this process. Even today, the American banking system has tens of thousands of branches. There is clearly an advantage of having a local office to monitor. This is one reason why the number of branches of steadily increased, even with better technology.

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[67] *See* Sumit Agarwal & Robert Hauswald, *Distance and Private Information in Lending*, 23 REV. FIN. STUD. 2757, 2758 (2010) ("We find that distance drives the following fundamental trade-off in the availability and pricing of credit: the closer a firm is to its branch office, the more likely the bank is to offer credit but also the more it charges *ceteris paribus*. Conversely, the closer a firm is to a competitor's branch, the less likely it is to obtain credit but, if it does, the lower the offered loan rate is."); *see also* Atif Mian, *Distance Constraints: The Limits of Foreign Lending in Poor Economies*, 61 J. FIN. 1465, 1465 (2006) (showing that greater distance between a foreign bank's headquarters and its local branches leads to lower levels of lending and renegotiations); Hans Degryse & Steven Ongena, *Distance, Lending Relationships, and Competition*, 60 J. FIN. 231, 262-63 (2005) (finding evidence for price discrimination based on distance between borrower and bank, which implies that "brick-and-mortar branching may remain vital in ensuring access to credit at reasonable rates, particularly for small firms and entrepreneurs").

[68] *See id.* at 2759.

[69] *See* Michael McLeay, Amar Radia & Ryland Thomas, *Money Creation in the Modern Economy*, Bank of England Quarterly Bulletin (2014 Q1) at 1 ("Rather than banks receiving deposits when households save and then lending them out, bank lending creates deposits."); *see also* MORGAN RICKS, THE MONEY PROBLEM: RETHINKING FINANCIAL REGULATION (2016) at 56-57, 73-77 (debunking the way money creation by banks is presented in introductory economics textbooks); BRAY HAMMOND, BANKS AND POLITICS IN AMERICA FROM THE REVOLUTION TO THE CIVIL WAR viii-ix (1991) ("The funds [banks] lend originate in the process of lending and disappear in the process of repayment. This creative faculty was far easier to observe a century and a half ago than it is now; for then the monetary funds that banks provided were commonly in the form of their own circulating notes, handed over the counter to the borrower, and the expansion of the circulating medium was the palpable and visible aspect of the expansion of credit. Every one recognized that the more banks lent, the more money there was.").

[70] *See* Douglas W. Diamond, *Financial Intermediation and Delegated Monitoring*, 51 REV. ECON. STUD. 393 (1984).

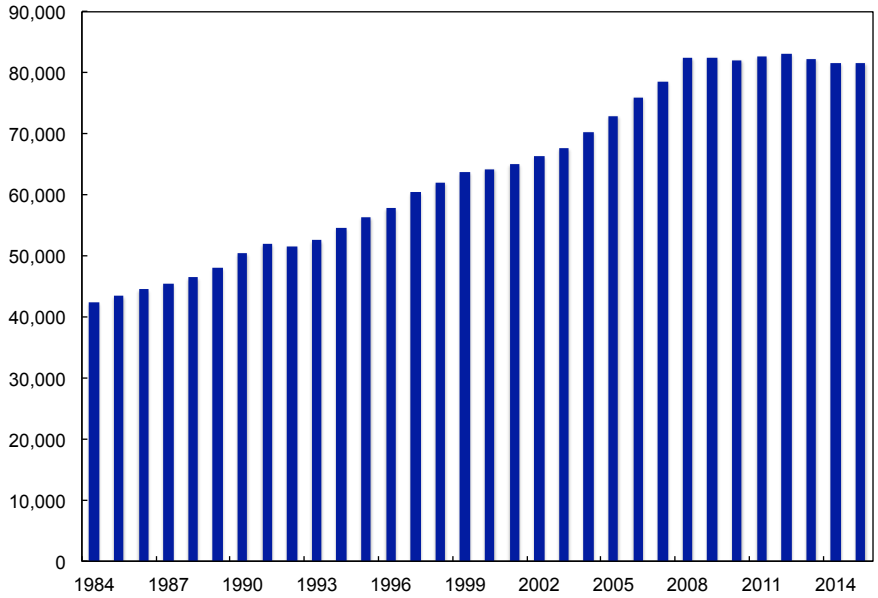

Figure 2.2: Number of Bank Branches in the United States

To illuminate the potential causal mechanism at work, the following regressions use state-level loan data from the Federal Deposit Insurance Corporation (FDIC). Table 2.7 presents the results of difference-in-differences regressions that utilize FDIC loan data as outcome variables. The annual state-level loan data are inflation-adjusted using state specific GDP deflators. Column (1) shows that state-level gross loan growth was roughly 3 percentage points higher post deregulation. The difference is highly significant. According to column (2), commercial and industrial loans, which are more indicative of borrowing by firms, also experienced higher average growth—nearly 4 percentage points higher—following deregulation. Column (3) looks at the change in loan charge-offs, which is a proxy of loan quality, and the result is not significantly different from zero. Taken together, the empirical evidence support the hypothesis that the increased growth rates post deregulation were associated with a greater volume of loans and investment, *not an improvement in loan quality*. While the loan loss ratio in column (4) is highly significant, it is clearly driven by the denominator (loan growth) and not the numerator (loan losses).

Table 2.7: Deregulation and Loan Growth

Variables	Gross Loans	C&I Loans	Loan Losses	Loan Loss Ratio
Deregulation	0.0304***	0.0392***	-0.0459	-0.0042***
	(0.0106)	(0.0131)	(0.0684)	(0.0011)

State F.E.	Y	Y	Y	Y
Year F.E.	Y	Y	Y	Y
State Trends	Y	Y	Y	Y
States	35	35	35	35
Years	1978-94	1978-94	1978-94	1978-94
Observations	595	595	595	595
R-squared	0.4826	0.4432	0.3956	0.4689

This result is consistent with recent findings by Krishnamurthy, who show that deregulation led to the integration of banking markets.[71] This, in turn, lowered the dependence of small business growth on local deposit supply. Given the present set of results, it is likely that access to additional sources of credit boosted the growth rate of loans, which improved economic conditions.

Notably, this finding is at odds with the position taken by Jayarante and Strahan, who find "little evidence that lending increased after intrastate branching was allowed."[72] Instead, they argue that "financial intermediation improves the *efficiency* of investment even if it does not increase the *level* of investment."[73] The analysis here shows that lending increased after the first instance of deregulation, which is consistent with the distance and lending story.[74] Once better capitalized banks enter into a credit constrained area, one would expect to see an increase in loans, assuming the acquired banks did not have sufficient capital to meet existing loan demands.

III. Trade-Off Between Regional and Systemic Stability

Section III examines the effect of state-level banking deregulation on interconnectedness and its impact on local and system-wide economic volatility. Policymakers and scholars have presented various theories describing the impact of interconnectedness in the financial system. It is accepted that a certain level of interconnectedness among banks is beneficial to financial markets because no single bank has access to all the funding and investment opportunities in an

[71] *See* Prasad Krishnamurthy, *Banking Deregulation, Local Credit Supply, and Small-Business Growth*, 58 J. L. & Econ. (2015)

[72] Jith Jayaratne & Philip E. Strahan, *The Finance-Growth Nexus: Evidence from Bank Branch Deregulation*, 111 Q. J. ECON. 639, 662 (1996)

[73] *Id.* at 664.

[74] This finding is also supported by Martin R. Goetz, Luc Laeven & Ross Levine, *Does the Geographic Expansion of Banks Reduce Risk?*, 120 J. FIN. ECON. 346 (2016) (finding no evidence that geographic expansion by banks improves loan quality).

economy. Thus, interbank lending plays an important role in improving the connection between savers and borrowers. This section also provides evidence to support the claim that interconnectedness improves regional stability. These are all significant benefits provided by interconnectedness.

On the other hand, policymakers and academics also hold the belief that too much interconnectedness may render the financial system fragile in times of stress.[75] For example, during the 2008 financial crisis, regulators were concerned that AIG's failure would lead to the failure of other major counterparties. The reason for this concern was the high level of interconnectedness between AIG and the rest of the financial system, including the big banks. In the post-crisis era, regulators have attempted to combat this problem of interconnectedness through, *inter alia*, heightened capital and liquidity standards,[76] orderly liquidation authority,[77] single-counterparty credit limits,[78] and minimum margin requirements on securities financing transactions.[79]

The analysis begins by examining the impact of deregulation on local volatility. During this period of deregulation, the country as a whole witnessed a substantial decline in macroeconomic volatility, as measured by GDP growth and related indicators. Stock and Watson investigate this phenomenon of volatility moderation at the national level and confirm its presence but do not conclusively attribute its existence to a source other than luck—namely, smaller structural shocks to the economy.[80] Figure 3.1 below provides visual evidence of this

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[75] *See* Allen N. Berger, Rebecca S. Demsetz & Philip E. Strahan, *The Consolidation of the Financial Services Industry: Causes, Consequences, and Implications for the Futures*, 23 J. BANK. & FIN. 135, 174 (1999) ("Consolidation may affect systemic risk in part because it changes the risks of individual institutions, particularly the risks of large institutions whose credit or liquidity problems may affect many other institutions.").

[76] *See* Andrew G. Haldane & Robert M. May, *Systemic Risk in Banking Ecosystems*, 469 NATURE 351, 354 (2011) (noting that higher capital ratios and liquidity requirements strengthen the absorption capacity of each bank in the financial system, thereby reducing the risk of a domino effect); *see also* Board of Governors of the Federal Reserve System, *Calibrating the GSIB Surcharge* (Jul. 20, 2015), *available at* http://www.federalreserve.gov/aboutthefed/boardmeetings/gsib-methodology-paper-20150720.pdf.

[77] *See* Daniel K. Tarullo, *Toward Building a More Effective Resolution Regime: Progress and Challenges*, Speech at "Planning for the Orderly Resolution of a Global Systemically Important Bank" Conference (Oct. 18, 2013), *available at* https://www.federalreserve.gov/newsevents/speech/tarullo20131018a.htm.

[78] *See* Board of Governors of the Federal Reserve System, *Calibrating the Single-Counterparty Credit Limit between Systemically Important Financial Institutions* (Mar. 4, 2016), *available at* http://www.federalreserve.gov/aboutthefed/boardmeetings/sccl-paper-20160304.pdf.

[79] *See* Financial Stability Board, *Transforming Shadow Banking into Resilient Market-Based Finance: Regulatory Framework for Haircuts on Non-Centrally Cleared Securities Financing Transactions* (Nov. 12, 2015), *available at* http://www.fsb.org/wp-content/uploads/SFT_haircuts_framework.pdf.

[80] *See* James H. Stock & Mark W. Watson, *Has the Business Cycle Changed and Why?*, 17 NBER Macroeconomics Annual 160 (2003).

volatility moderation. One can see that, before the 1980s, there were more peaks in the volatility series and the peaks were more frequent. Even with the presence of the 2008 financial crisis, the peaks in volatility in the 1980s and beyond occur with lesser frequency.

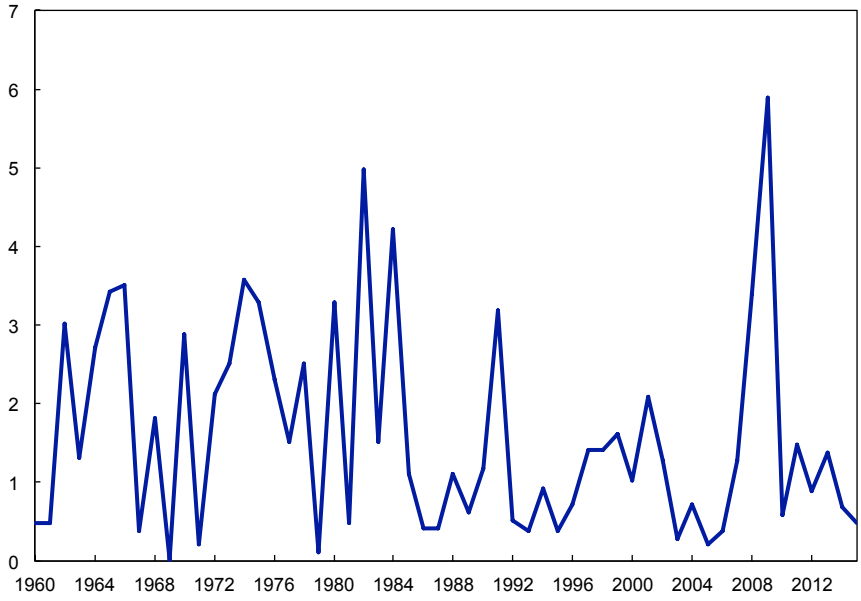

Figure 3.1: Raw Volatility of Real GDP Growth

Thus, the first question is: Did banking deregulation contribute to the decline in state-level volatility witnessed during the 1980s and 1990s? There is reason to believe so. Deregulation allowed banks to merge with or acquire other banks within states and sometimes across state lines. This would not only increase the robustness of financing in the impacted regions but would also allow for greater flows of capital across geographic regions. All else equal, this brings about an increase in risk diversification. Indeed, using similar regression techniques as those in Section II, the empirical evidence below points to lower volatility post-deregulation. Specifically, the volatility of state-level employment growth and state-level personal income growth decline significantly.

To be sure, economic volatility is not limited to regional fluctuations, as the 2008 financial crisis demonstrated all too clearly. After showing that deregulation dampened *local* volatility, the following analysis provides evidence consistent with the argument that deregulation contributed to *systemic* fragility by increasing interconnectedness. The basic argument is as follows: On the one hand, a more interconnected network allows the losses of a distressed bank to be spread among more creditors, thereby reducing the impact of the adverse shock on the entire system. On the other hand, greater interconnectedness may destabilize the

system, because a growing number of counterparties results in a higher probability of systemic collapse. As the reader will see, these trade-offs have recently been the subject of analysis and debate within both policy and academic circles. Indeed, Andrew Haldane of the Bank of England gave a widely cited speech in which he said interconnectedness is associated with a "knife's edge" property.[81] In essence, this property ties together the trade-off discussed above: As long as the adverse shocks are sufficiently small, interconnectedness enhances financial stability, because the losses of a single distressed bank are passed onto a lager number of counterparties. However, if the adverse shocks are sufficiently large, then weaker interconnections are more beneficial because the senior creditors of a single distressed bank would bear most of the losses, thereby protecting the rest of the system against cascading defaults.[82] The second half of this section makes the case that interconnectedness increased significantly following deregulation, particularly after the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994. In sum, the gains from deregulation (and interconnectedness) came in the form of lower regional volatility in the 1980s and 1990s. But as interconnectedness increased to unprecedented levels, the system began to teeter on the knife's edge.

A. Literature Review

This analysis contributes to the literature by presenting evidence consistent with this conjectured trade-off between regional and systemic stability. A few scholars have empirically investigated the first half of the equation, that is, the impact of deregulation on regional volatility. Morgan et al. were the first to conduct an in-depth analysis of this topic.[83] They describe an intuitive model in which bank holding companies act as internal capital markets, shuffling capital between its banks in different states. In their framework, greater integration of the banking sector between states may cause higher or lower volatility, depending on

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[81] Andrew G. Haldane, *Rethinking the Financial Network*, Speech at the Financial Student Association, Amsterdam (Apr. 2009), *available at* http://www.bis.org/review/r090505e.pdf;

[82] Notably, the intuition here is very similar to the problem of interconnections in the context of power grids. *See* JR Minkel, *The 2003 Northeast Blackout—Five Years Later*, Scientific American (Aug. 13, 2008), *available at* http://www.scientificamerican.com/article/2003-blackout-five-years-later/ ("Because electricity in power lines cannot be stored, generation and load have to match up at all times or the grid enters blackout territory. That can result from a lack of generating capacity—the cause of the 2000 California blackouts—or because of one or more faults, as in the 2003 blackout. The interconnectedness of the grid makes it easier to compensate for local variations in load and generation but it also gives blackouts a wider channel over which to spread.").

[83] *See* Donald P. Morgan, Bertrand Rime & Philip E. Strahan, *Bank Integration and State Business Cycles*, 119 Q. J. Econ. 1555 (2004).

the frequency and severity of loan supply shocks versus loan demand shocks. In the case of loan supply shocks, a bank holding company can mitigate the damages by injecting loans into the affected state, thereby dampening the impact of the supply shock. In the case of loan demand shocks, however, greater integration may exacerbate the problem because a bank holding company can pull additional resources out of the affected state, thereby contracting supply in that state. Thus, the authors note that, a priori, it is not clear how the deregulation of interstate banking will affect economic volatility. After performing a series of panel regressions using interstate banking deregulation indicators and financial integration measures constructed from the Call Reports data, the authors conclude that the deregulation of interstate banking had a significant impact on state business cycles as state banking sectors become more integrated via bank holding companies. Specifically, fluctuations in a state's economic growth fell and these fluctuations synced in states with greater financial integration.

The academic literature does not hold one particular viewpoint on the second half of the equation, namely, interconnectedness and systemic crisis. One camp argues that a more interconnected financial system enhances the resilience of the system to the insolvency of any individual bank. The rationale is that a more interconnected network allows the losses of the distressed bank to be spread among more creditors, thereby reducing the impact of the adverse shock on the entire system.[84] The other camp argues that the greater interconnectedness may destabilize the system, because a growing number of counterparties results in a higher probability of systemic collapse.[85] Recently, however, a new synthesis has emerged.[86] It claims that interconnectedness has a "knife-edge" property.[87] Andrew G. Haldane describes it as such:

> Perhaps the key one concerns the "robust-yet-fragile" property of connected networks. The intuition behind this result is beguilingly simple, but its implications profound. In a

[84] *See, e.g.*, Franklin Allen & Douglas Gale, *Financial Contagion*, 108 J. Political Economy 1 (2000); Xavier Freixas, Bruno M. Parigi & Jean-Charles Rochet, *Systemic Risk, Interbank Relations, and Liquidity Provision by the Central Bank*, 32 J. Money, Credit & Banking 611 (2000).

[85] *See, e.g.*, Vivier-Lirimont (2006); Blume et al. (2011, 2013).

[86] *See* HAL S. SCOTT, CONNECTEDNESS AND CONTAGION: PROTECTING THE FINANCIAL SYSTEM FROM PANICS 297 (2016) ("These papers attempt to characterize how the structure of linkages [networks] between individual institutions affects the likelihood and severity of a system wide funding dry up. . . . Many studies have analyzed how direct funding linkages, while introducing the possibility of systemic failure, can also prevent such failure when banks engaging in cross-holdings of deposits effectively insure each individual bank against an idiosyncratic liquidity shock.")

[87] *See, e.g.*, Andrew G. Haldane, *Rethinking the Financial Network*, Speech at the Financial Student Association, Amsterdam (Apr. 2009), *available at* http://www.bis.org/review/r090505e.pdf; Daron Acemoglu, Asuman Ozdaglar & Alireza Tahbaz-Salehi, *Systemic Risk and Stability in Financial Networks*, 105 American Economic Review 564 (2015).

> nutshell, interconnected networks exhibit a knife-edge, or tipping point, property. Within a certain range, connections serve as a shock-absorber. The system acts as a mutual insurance device with disturbances dispersed and dissipated. Connectivity engenders robustness. Risk-sharing—diversification—prevails.
>
> But beyond a certain range, the system can flip the wrong side of the knife-edge. Interconnections serve as shock-amplifiers, not dampeners, as losses cascade. The system acts not as a mutual insurance device but as a mutual incendiary device. Risk-spreading—fragility—prevails. The extent of the systemic dislocation is often disproportionate to the size of the initial shock. Even a modest piece of news might be sufficient to take the system beyond its tipping point. This same basic logic has latterly been applied to financial systems, using mathematical models and simulated data.[88]

Acemoglu, Ozdaglar, and Tahbaz-Salehi incorporate this theory into a mathematical model with the following features: As long as the magnitude of the adverse shocks are sufficiently small, interconnectedness enhances financial stability because the losses of a single distressed bank are passed onto a lager number of counterparties. The system is stabilized by virtue of every bank absorbing a small piece of the damage. However, if the adverse shocks are sufficiently large, then weaker interconnections are more beneficial because the senior creditors of a single distressed bank would bear most of the losses, thereby protecting the rest of the system against cascading defaults. Notably, Acemoglu et al. point out that "weakly connected financial networks are somewhat reminiscent of the old-style unit banking system, in which banks with a region are only weakly connected to the rest of the financial system, even though intra-region ties might be strong."[89] The state of banks prior to the deregulation of restrictions on geographic expansion correspond to the weakly connected scenario, whereas the post-deregulation world of banking correspond to the opposite.

The objective of this section is to provide empirical support for the idea that interconnectedness is beneficial for smoothing out idiosyncratic shocks but can lay the groundwork for systemic collapse. In doing so, this section acknowledges that interconnectedness does not tell the entire story. Canada is the prototypical counterexample to why interconnectedness is only a necessary, but not sufficient, condition for the occurrence of financial crises. Numerous studies point out that Canadian banks were highly integrated across regions during the 1930s, and almost all survived the Great Depression.[90] The same was true during the 2008 financial crisis.[91] But as the theory above notes, the severity of the shock also matters.

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[88] Haldane, *supra* note 110, at 5.

[89] Acemoglu et al., *supra* note 110, at 566 n. 4.

[90] *See, e.g.*, Morgan et al., *supra* note 106, at 1557.

[91] Given this counterexample, one could argue that having an oligopoly is more stable. First, they take less risk because there is inherently weaker competition. This could be interpreted

B. Main Empirical Results

The data used in these state-level regressions are the same as those in the previous section. The outcome variables are still annual state-level GDP, quarterly state-level personal income, and monthly state-level employment. And the explanatory variable is still the binary deregulation indicator, specifically the first instance of deregulation. However, instead of investigating the impact of deregulation on growth rates, the analysis looks at the volatility of the growth rates.

Volatility in this context is motivated by the raw volatility method proposed by Stock and Watson.[92] That is, volatility is defined as the absolute deviation from the mean of the growth rate. However, recall that Section II shows a different growth rate before and after deregulation. Thus, one must first account for differences in growth averages before and after deregulation before taking the absolute deviation. For clarity, here is the econometric specification for deriving the state-level volatility series:

$$Growth_{i,t} = a_i + a_t + a_{i,t} + \beta \times Deregulation_{i,t} + \varepsilon_{i,t}$$

$$Volatility_{i,t} = |\varepsilon_{i,t}|$$

The top econometric specification is taken from the previous section. Controlling for state fixed effects, time fixed effects, and state-specific time trends, the regression tests whether deregulation impacted the average growth rate of deregulating states. The results from the previous section suggest the answer is yes. Next, controlling for all the factors that apparently affect state-level economic growth, the second equation constructs a volatility measure by taking the absolute value of the regression residual.[93] This method is analogous to the raw volatility series constructed by Stock and Watson. Figures 3.2 and 3.3 below provide examples of what the volatility measure looks like at the state level.

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as high charter values. Second, regulators have an easier time managing them because there are only a handful of banks to examine.

[92] Stock & Watson, *supra* note 103.

[93] Notably, the results still hold if one believes that deregulation had no impact on the state-level growth rates, that is, if the deregulation indicator is removed from the top specification.

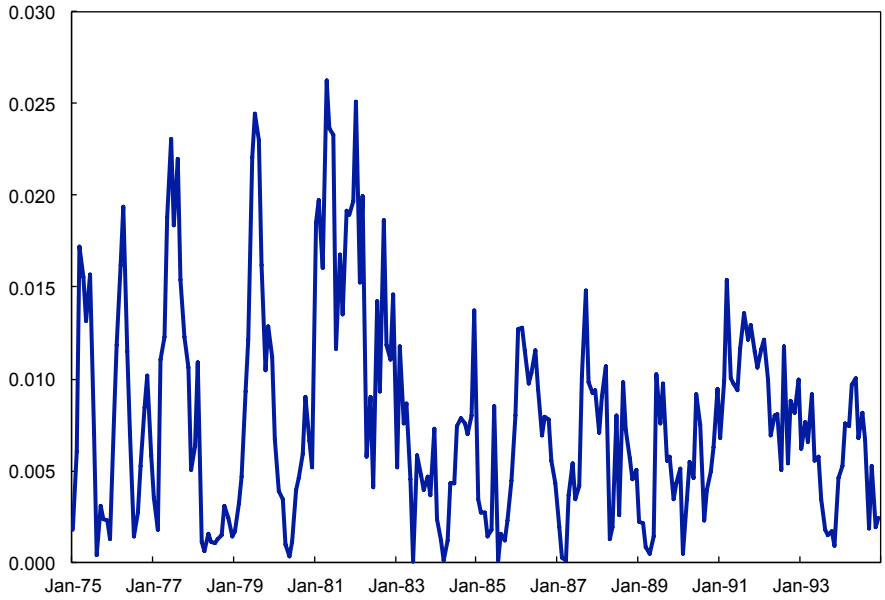

Figure 3.2: Volatility of Alabama Employment Growth

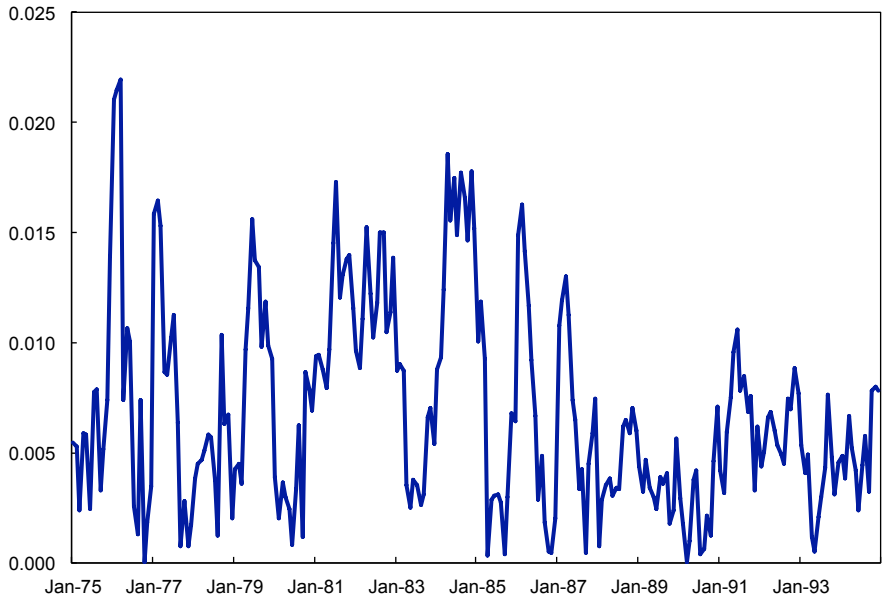

Figure 3.3: Volatility of Minnesota Employment Growth

The first shows the volatility of monthly employment growth in Alabama, which removed intrastate restrictions in 1981 and interstate restrictions in 1987. The second depicts the same series for Minnesota, which removed intrastate restrictions in 1993 and interstate restrictions in 1986. Both graphs show a moderation of local volatility in the 1980s.

Finally, it should be noted that there is no dataset on cross-border loans, which means we do not know, for example, the exact amount Minnesota banks

lent to Alabama banks.[94] Having that dataset would be ideal because one could better identify the underlying causal mechanism behind the reduction in volatility.

The state-level regressions in this subsection are straightforward. Given the volatility series in each state, the regressions simply conduct a before-and-after comparison. That is, did volatility change in the post-deregulation era. Notably, the construction of the volatility series already stripped out aggregate time effects and state-specific characteristics, so one only needs to compare the before and after of the resulting series.

Table 3.1 provides the results of the difference-in-differences regression. The strongest result shows that interstate deregulation appears to have reduced the volatility of GDP growth quite significantly—the coefficient is around 0.3 percentage point.

Table 3.1: Effects of Deregulation on GDP Volatility[95]

Variables	GDP Growth	GDP Growth	GDP Growth
Deregulation	-0.0022*	-	-
	(0.0012)		
Intrastate Deregulation	-	-0.0015	-
		(0.0012)	
Interstate Deregulation	-	-	-0.0034***
			(0.0012)
States	35	35	35
Years	1978-94	1978-94	1978-94
Observations	595	595	595

The story is slightly different, however, for both employment volatility and personal income volatility. Figure 3.4 plots average state-level employment volatility from 1975 through 1994. Volatility clearly begins to trend downward after the mid 1980s. The regressions in Table 3.2 corroborate the significant decline in state-level employment volatility. Notably, the coefficient on the first instance of deregulation seems to be just as significant as the coefficient on interstate deregulation. These results are in line with the findings of

[94] *See* Morgan et al., *supra* note 106.

[95] Annual state-level GDP data are from BEA. Regressions begin in 1978 due to data limitations.

Krishnamurthy that "deregulation enabled banks and businesses to reduce their reliance on local sources of funds. The consolidation of BHCs into single banks appears to have smoothed access to credit in MSA markets."[96]

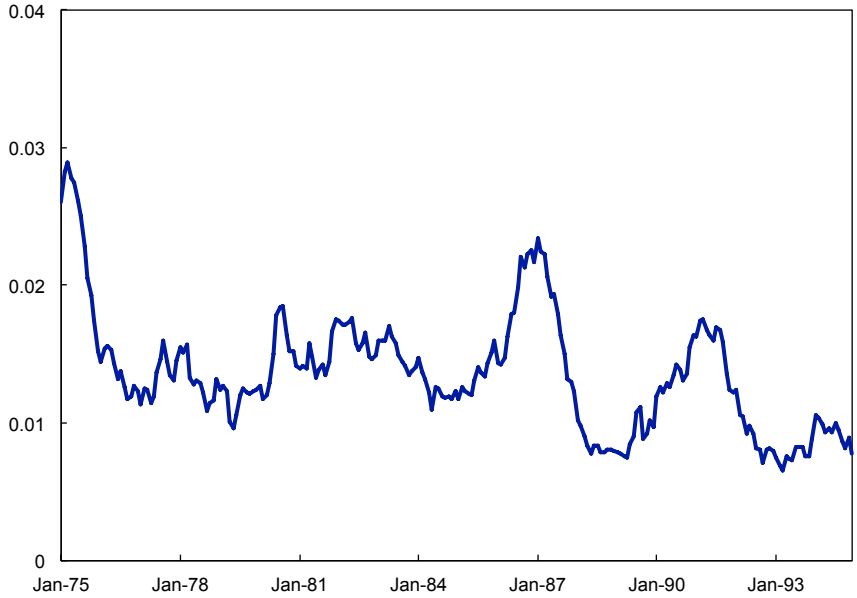

Figure 3.4: State-Level Employment Volatility

Table 3.2: Effects of Deregulation on Employment Volatility[97]

Variables	EMP Growth	EMP Growth	EMP Growth
Deregulation	-0.0037***	-	-
	(0.0003)		
Intrastate Deregulation	-	- 0.0035***	-
		(0.0003)	
Interstate Deregulation	-	-	-0.0031***
			(0.0003)
States	35	35	35

[96] Prasad Krishnamurthy, *Banking Deregulation, Local Credit Supply, and Small-Business Growth*, 58 J. L. & ECON. 935 (2015).

[97] Annual state-level GDP data are from BEA. Regressions begin in 1978 due to data limitations.

Years	1978-94	1978-94	1978-94
Observations	7140	7140	7140

Figure 3.5 and Table 3.3 below present the same narrative for the volatility series of state-level personal income.

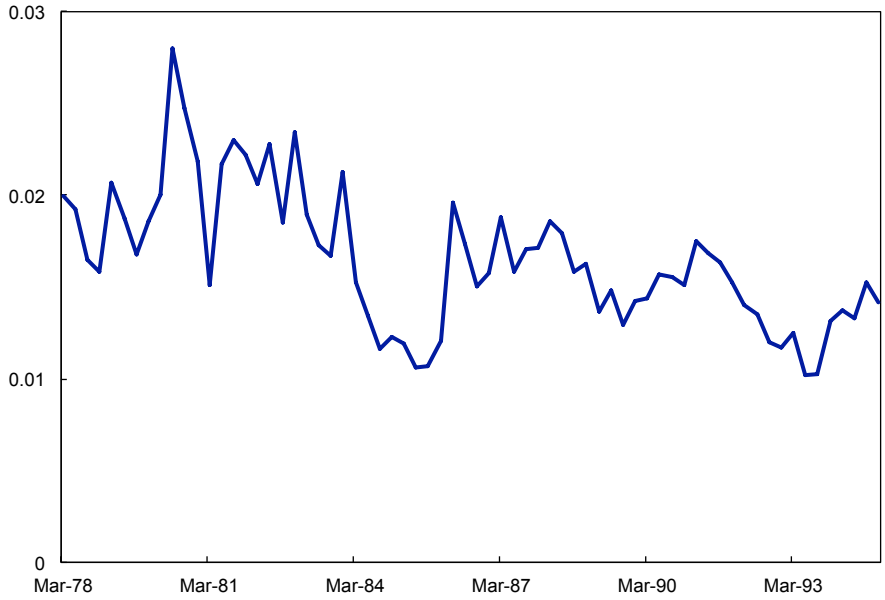

Figure 3.5: State-Level Personal Income Volatility

Table 3.3: Effects of Deregulation on Personal Income Volatility[98]

Variables	PI Growth	PI Growth	PI Growth
Deregulation	-0.0062***	-	-
	(0.0007)		
Intrastate Deregulation	-	- 0.0059***	-
		(0.0007)	
Interstate Deregulation	-	-	-0.0062***
			(0.0007)
States	35	35	35
Years	1978-94	1978-94	1978-94

[98] Annual state-level GDP data are from BEA. Regressions begin in 1978 due to data limitations.

Observations	2380	2380	2380

Theoretically, the results are not surprising. Mitigating volatility requires diversifying away adverse local shocks. In bad times, businesses and individuals would need to acquire capital inflows from another area that is not undergoing the same problems. This can be accomplished by expanding to other cities within a state or, perhaps more effectively, by expanding to cities in other states. Thus, the takeaway is that deregulation—especially interstate deregulation—contributed to the decline in state-level volatility. This result is in line with the findings presented in the literature, and is a straightforward extension of risk diversification across geographical areas.

The main concern, like in Section II, is spurious correlation associated with the potential non-random timing of deregulation. That is, how much of the decline in volatility is due to a natural recovery from a recession? To partially address this question, the regressions in Table 3.4 below remove all observations within a two-year window of the deregulation date to control for the immediate post-recession recovery.

Table 3.4: Robustness Check for Non-Random Timing[99]

Variables	GDP Growth	EMP Growth	PI Growth
Interstate Deregulation	-0.0034***	-0.0031***	-0.0062***
	(0.0012)	(0.0003)	(0.0007)
States	35	35	35
Years	1978-94	1978-94	1978-94
Observations	595	7140	2380

The main result still holds. The removal of cross-state restrictions on mergers and acquisitions appears to have allowed banks to diversify away state-specific idiosyncratic shocks. Moreover, the magnitude is nontrivial. According to columns (1) and (2), the impact on GDP and employment volatility is roughly 0.3 percentage point. And according to column (4), the impact on personal income volatility is 0.6 percentage point. Note that average state-level growth during that era was 2.1 percent and 3.1 percent for employment and personal income,

[99] Annual state-level GDP data are from BEA. Regressions begin in 1978 due to data limitations.

respectively. Furthermore, this is consistent with the findings of Morgan et al., who show that the deregulation of interstate banking had a significant impact on state business cycles as state banking sectors become more integrated via bank holding companies.[100] Fluctuations in a state's economic growth fell and these fluctuations synced in states with greater financial integration.[101]

C. Interconnectedness and Systemic Fragility

While deregulation may have brought about improvements in regional economic growth and regional stability, it furnished conditions for greater systemic fragility.[102] As Haldane and Acemoglu et al. suggest, interconnectedness presents a knife-edge problem. If the shocks are large enough, a more interconnected system faces a greater chance of failing. Notably, banking deregulation not only created a more concentrated and interconnected financial system, but also contributed to the downward pressures on charter values that increased the chances of the large shock occurring. This subsection presents empirical evidence consistent with the knife-edge property of interconnectedness.[103]

Using proxies for interconnectedness, one can identify the roots of this problem beginning in the mid-1980s. First, recall the wave of mergers and acquisitions that occurred in the 1980s and 1990s due to deregulation. Figure 3.6 below shows the assets acquired during that era. The red bar denotes the year when Riegle-Neal was passed.

[100] *See* Morgan et al., *supra* note 106.

[101] Another simple check involves looking at economic volatility in countries that did not have such regulations. Canada is a prime candidate. While Canada is similar to the United States is various regards, it did not have a fragmented banking market during the time period. Its banks could expand across geographic boundaries. Based on available provincial GDP data from 1982 to 1994—and stripping out a national time growth trend—one finds that average volatility was 1.9 percentage points in Canadian provinces. Over the same period, the analog for the U.S. states was 2 percentage points.

[102] *Cf.* Philip E. Strahan, *The Real Effects of U.S. Banking Deregulation*, St. Louis Fed at 24-25 ("Sometimes we think that higher returns necessarily come at the cost of greater risk, but in the case of U.S. banking deregulation, volatility of the economy *declined* as growth went up.") (emphasis original).

[103] Unfortunately, most of these proxies of interconnectedness are not available at the state level. Therefore, the analysis cannot use the difference-in-differences methodology.

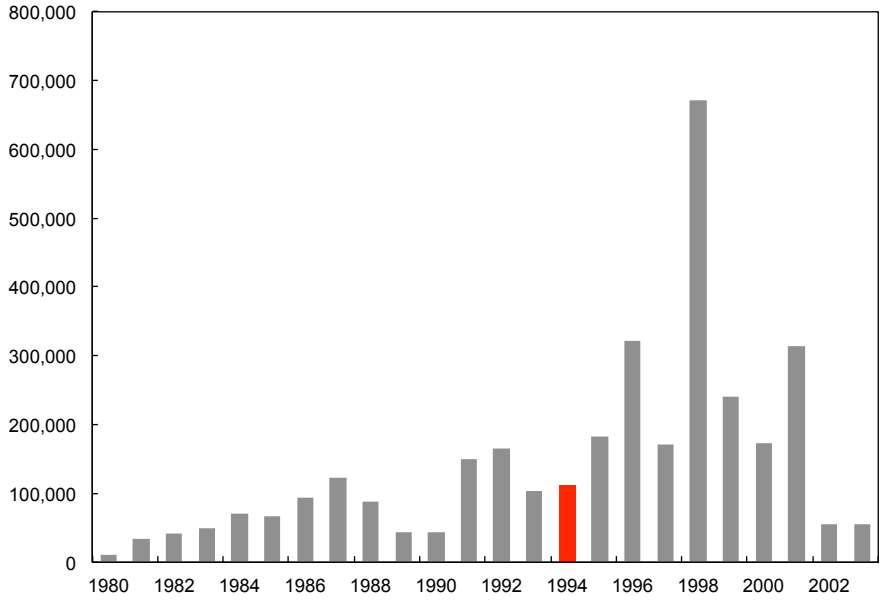

Figure 3.6: Assets Acquired through Mergers and Acquisitions

Based on the literature, there are a few straightforward methods to proxy interconnectedness: the interbank loan ratio; the use of securitization; and the concentration of banks. Figure 3.7 below shows the component of net loans and leases that are loans to other depository institutions. The data begin in 1990 and are courtesy of SNL. According to a recent Bank of England study, the loans-to-other-depository-institutions series is a straightforward way to measure "direct interconnectedness," otherwise known as credit exposures between banks.[104] The first takeaway is that interbank loans of this sort only make up a small fraction of total loans and leases (under three percent). The second is that this series does increase in the 1990s—especially after 1994—as interstate mergers and acquisitions skyrocketed following Riegle-Neal.

[104] *See* Zijun Lio, Stephanie Quiet & Benedict Roth, *Banking Sector Interconnectedness: What Is It, How Can We Measure It and Why Does It Matter?*, Bank of England Quarterly Bulletin (2015 Q2).

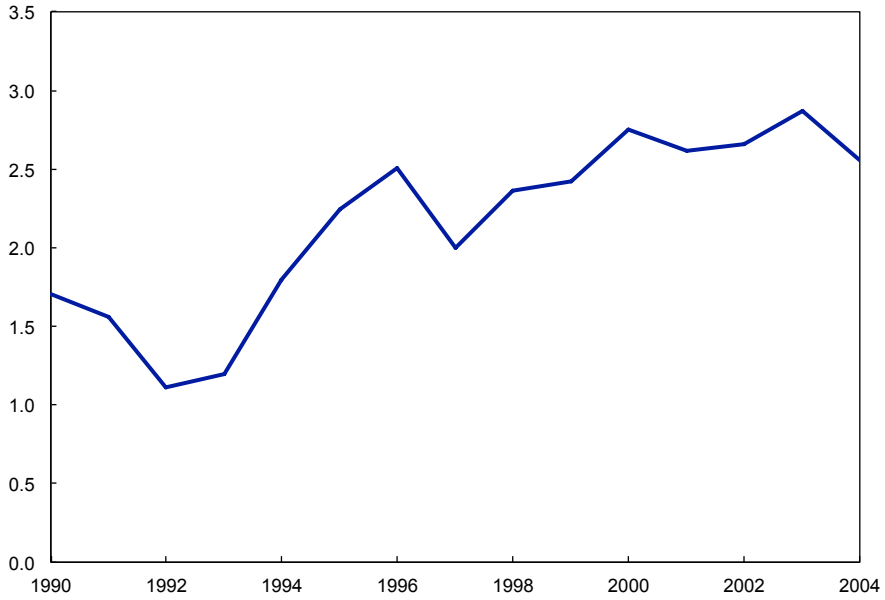

Figure 3.7: Loans to Other Depository Institutions

Of course, interbank loans do not tell the full story of interconnectedness. Both the Bank of England and the Office of Financial Research use securities financing transactions to measure interconnectedness.[105] Figure 3.9 below depicts total private securitization as a share of total bank loans. The series is constructed using the Federal Reserve's Flow of Funds data. The numerator uses Table L.211[106] and Table L.126.[107] These two should capture the total amount of private securitization in the U.S. economy. The denominator uses Table L.214.[108] Similar to Figure 3.7 above, the securitization series in Figure 3.8 also increases dramatically in the 1990s.[109]

[105] *See* Meraj Allahrakha, Paul Glasserman & H. Peyton Young, *Systemic Importance Indicators for 33 U.S. Bank Holding Companies: An Overview of Recent Data*, Office of Financial Researrch Brief Series (Feb. 2015).

[106] Agency- and GSE-Backed Securities, Row 1 (Total Liabilities).

[107] Issuers of Asset-Backed Securities, Row 14 (Total Liabilities).

[108] Loans, Row 1 (Total Loans).

[109] Notably, the report by the Office of Financial Research on measuring interconnectedness utilizes the Federal Reserve's Y-15 form. However, the Y-15 form has only been in place for a few years, so it does not allow for a historical review.

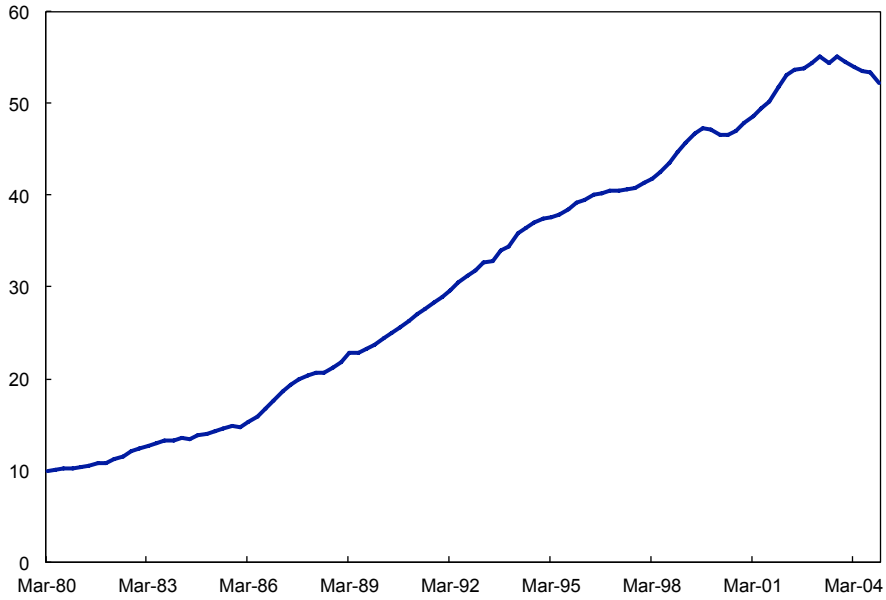

Figure 3.8: Private Securitization

Finally, Figure 3.9 below plots the asset concentration of the top-10 U.S. banks as a proxy of interconnectedness. Haldane and May motivate the importance of concentration as follows:

> There has been a spectacular rise in the size and concentration of the financial system over the past two decades, with the rapid emergence of 'super-spreader institutions' too big, connected or important to fail. The collateral damage, to both the real economy and financial system, following the failure of Lehman Brothers in October 2008 is testimony to the force of such super-spreader dynamics.[110]

Haldane and May present an asset concentration series of the top-3 U.S. banks going back to the 1930s, but the takeaway is identical for the top-10 series: these large and interconnected banks began growing in the 1990s once interstate mergers took off.

[110] *See* Haldane & May, *supra* note 99, at 354.

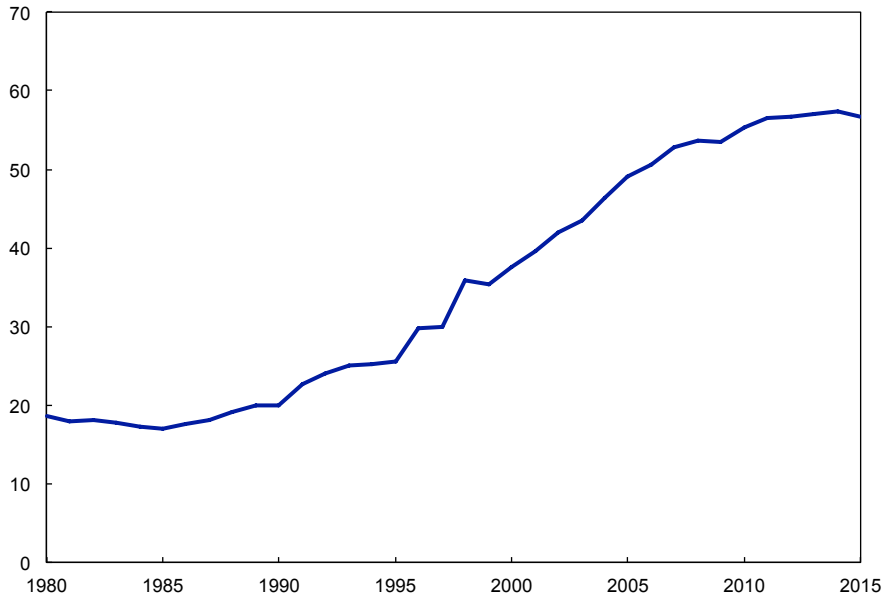

Figure 3.9: Concentration of Assets

Finally, one can employ stave-level difference-in-differences methodology to clearly show that the banking sector became more interconnected as they expanded in size and reach through mergers and acquisitions. The data consist of bank deposit shares in Metropolitan Statistical Areas (MSAs). Following the lead of Krishnamurthy, one can construct a measure of within-state integration and an across-state integration measure. The within-state measure, "Market/State Deposit Ratio," is defined as one minus the ratio of total deposits held in state by banks or bank holding companies in that market to total deposits in a market.[111] Thus, a value of zero means the market consists only of single-market banks, and a higher value corresponds to greater within-state integration. The across-state measure, "State/U.S. Deposit Ratio," is defined as one minus the ratio of total deposits held in state by banks or bank holding companies in that market to total U.S. deposits. Thus, a value of zero indicates a market consisting solely of within-state banks, and a higher value corresponds to greater across-state integration.[112] These ratios are constructed for both banks and bank holding companies.

The regression specification utilizes observations at the MSA level:

$$Integration_{i,s,t} = \alpha_i + \alpha_t + a_{i,t} + \beta \times Deregulation_{s,t} + \varepsilon_{i,s,t}$$

[111] Krishnamurthy, *supra* note 119.
[112] *Id.*

where subscript *i* refers to a particular MSA; subscript *s* refers to a state; and subscript *t* refers to a year. $Integration_{i,s,t}$ is therefore the measure of integration in MSA *i*, in state *s*, in year *t*. α_i corresponds to MSA fixed effects; α_t corresponds to year fixed effects; and $a_{i,t}$ captures MSA-specific time trends. As before, $Deregulation_{s,t}$ is the deregulatory indicator in state *s*, at year *t*. The results are presented below in Tables 3.5 and 3.6.

Table 3.5: Interconnectedness Within States[113]

Variables	Bank Market/State Deposit Ratio	BHC Market/State Deposit Ratio
Intrastate Deregulation	0.178*** (0.019)	0.052*** (0.013)
MSAs	269	269
States	35	35
Years	1978-94	1978-94
Observations	4573	4573

Table 3.6: Interconnectedness Across States[114]

Variables	Bank State/U.S. Deposit Ratio	BHC State/U.S. Deposit Ratio
Interstate Deregulation	-0.002 (0.001)	0.113*** (0.018)
MSAs	269	269
States	35	35
Years	1978-94	1978-94
Observations	4573	4573

[113] The underlying data of integration measures at the MSA level are from Krishnamurthy, *supra* note 119. The author thanks Prasad Krishnamurthy for generously sharing his data.

[114] The underlying data of integration measures at the MSA level are from Krishnamurthy, *supra* note 119. The author thanks Prasad Krishnamurthy for generously sharing his data.

Regressing these integration measures on deregulation indicators yields an intuitive result. After intrastate deregulation, market integration increased significantly within states, regardless of whether one looks at banks or bank holding companies. Following interstate deregulation, market integration increased across states thanks to expansion by bank holding companies.[115]

In sum, the above evidence in Tables 3.5 and 3.6 paints a picture consistent with the idea that interconnectedness is beneficial for economic stability when absorbing idiosyncratic, state-specific shocks. However, interconnectedness also furnishes the condition for systemic fragility by acting as a propagation mechanism when shocks are not relatively local. Again, interconnectedness and concentration do not tell the entire story, as countries like Canada show interconnectedness is only a necessary condition.

IV. Conclusion

Seven years after the passage of Dodd-Frank, the political environment has pivoted strongly toward deregulation. The deregulatory actions considered now—for example, simplifying or eliminating the Volcker rule, or revising the threshold of assets above which financial institutions are considered systemically important[116]—would naturally increase the scope of banks' operations. Such an expansion would lead to an increase in counterparties or to an increase in the magnitude of exposures with existing counterparties. Looking at episodes of banking deregulation in the United States during the late twentieth century, policymakers can see that this would result in increased growth on one hand and greater systemic fragility on the other.

Notably, this trade-off does not mean policymakers should shy away from tweaking existing regulations in Dodd-Frank. There is certainly room for improvement. Regulators, however, must be careful to balance the growth-stability seesaw. In this vein, they should finalize rules aimed at monitoring and curbing systemic risk. This could take the form of a rule requiring higher capital requirements, which is already in place.[117] Or, more directly, this could take the form of a rule that requires monitoring banks' counterparty exposures and

[115] These empirical results are consistent with the results in Tables 4 and 5 of Krishnamurthy, *supra* note 119.

[116] *See* Tarullo, *supra* note 3.

[117] *See* id.; *see also* Board of Governors of the Federal Reserve System, *Calibrating the GSIB Surcharge* (Jul. 20, 2015), *available at* http://www.federalreserve.gov/aboutthefed/boardmeetings/gsib-methodology-paper-20150720.pdf.

capping them before they reach excessive levels; such a rule is currently in the process of being finalized.[118]

The analysis supporting this conclusion is presented in Sections II and III of this article. There are three main takeaways from Section II. First, the removal of restrictions on geographic expansion by banks through mergers and acquisitions significantly contributed to the increase in local economic growth. Second, the *first* instance of deregulation caused an increase in economic growth, regardless of whether it was the removal of within-state or across-state constraints. And third, it is likely that the reduction in distance between banks and credit-constrained borrowers led to more loan issuances, which increased growth.

The existing literature focuses on the consequences of intrastate deregulation.[119] The present study agrees that intrastate deregulation played an important role in improving real economic conditions. Indeed, the vast majority of bank mergers and acquisitions pre-1994 occurred within state boundaries. However, it would be remiss to say that interstate mergers and acquisitions had no impact. Given the transaction costs associated with greater distance between borrower and lender, the benefits of geographic diversification were gained with any type of expansionary action. States that removed their interstate banking restrictions before their intrastate branching restrictions benefited, on average, from their actions. The same holds true for those that led with intrastate deregulation. Additionally, the present study points to evidence suggesting that increased loans from banks was the likely cause of the higher rate of real economic growth after deregulation. This empirical observation is in line with economic theory but not with the existing literature, which argues that the gains were derived through higher investment efficiency rather than a higher volume of investment.

Section III presents empirical evidence in favor of two claims: first, removal of geographic restrictions during the 1980s and 1990s improved regional stability in the form of lower state-level volatility; and second, deregulation led to greater interconnectedness, which contributed to the first benefit but also worsened systemic fragility. Thus, the analysis highlights a potential trade-off between regional and systemic stability.

Lastly, these findings also illuminate an avenue for additional research. Taken together, Sections II and III present a broad trade-off between growth and stability. This particular trade-off is a known phenomenon internationally. For

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[118] *See* Federal Reserve System, *Single-Counterparty Credit Limits for Large Banking Organizations; Proposed Rule*, 81 Federal Register 14328 (Mar. 16, 2016); *see also* Board of Governors of the Federal Reserve System, *Calibrating the Single-Counterparty Credit Limit between Systemically Important Financial Institutions* (Mar. 4, 2016), *available at* http://www.federalreserve.gov/aboutthefed/boardmeetings/sccl-paper-20160304.pdf.

[119] *See, e.g.*, Jayaratne & Strahan, *supra* note 93; Beck et al., *supra* note 73.

instance, Ranciere, Tornell, and Westermann uncover a positive relationship between systemic risk and growth.[120] They show that countries that have experienced financial crises have grown faster than countries without such experiences, on average between 1960 and 2000.[121] While they tell a story of financial liberalization and contract enforceability, it would be interesting to see if banking deregulation and heightened interconnectedness also exist in those countries.

[120] *See* Romain Ranciere, Aaron Tornell & Frank Westermann, *Systemic Crises and Growth*, 123 Q. J. ECON. 359, 359 (2008) ("To explain this finding, we present a model in which contract enforceability problems generate borrowing constrains and impede growth. In financially liberalized economies with moderate contract enforceability, systemic risk taking is encouraged and increases investment. This leads to higher mean growth but also to greater incidence of crises.")

[121] *Id.*

Appendix

The regressions in this article utilize deregulation indicators constructed from the dates in Table A.1, which presents the year in which each state removed its intrastate and interstate restrictions. As one can see, there are states like Alabama, which deregulated intrastate first; and there are states like Minnesota, which deregulated interstate first. The type and order of deregulation is noteworthy. Section II shows that the loosening of *any* type of restriction was associated with higher state-level economic growth. Section III points out the consequences of interstate deregulation on local volatility and systemic fragility.

Table A.1: Deregulation Dates

State	Interstate Deregulation	Intrastate Deregulation
Alabama	1987	1981
Alaska	1982	1960
Arizona	1986	1960
Arkansas	1989	1994
California	1987	1960
Colorado	1988	1991
Connecticut	1983	1980
Delaware	1988	1960
District of Columbia	1985	1960
Florida	1985	1988
Georgia	1985	1983
Hawaii	1997	1986
Idaho	1985	1960
Illinois	1986	1988
Indiana	1986	1989
Iowa	1991	1999
Kansas	1992	1987
Kentucky	1984	1990
Louisiana	1987	1988
Maine	1978	1975
Maryland	1985	1960
Massachusetts	1983	1984
Michigan	1986	1987
Minnesota	1986	1993
Mississippi	1988	1986
Missouri	1986	1990

Montana	1993	1990
Nebraska	1990	1985
Nevada	1985	1960
New Hampshire	1987	1987
New Jersey	1986	1977
New Mexico	1989	1991
New York	1982	1976
North Carolina	1985	1960
North Dakota	1991	1987
Ohio	1985	1979
Oklahoma	1987	1988
Oregon	1986	1985
Pennsylvania	1986	1982
Rhode Island	1984	1960
South Carolina	1986	1960
South Dakota	1988	1960
Tennessee	1985	1985
Texas	1987	1988
Utah	1984	1981
Vermont	1988	1970
Virginia	1985	1978
Washington	1987	1985
West Virginia	1988	1987
Wisconsin	1987	1990
Wyoming	1987	1988

For any given state, the deregulation indicator equals zero in a given year if the state still has restrictions in place. Separate indicators are created for intrastate deregulation, interstate deregulation, and the first instance of deregulation. Table A.2 below provides an example of what these indicators look like for Alabama. The same construction is used for all other states.

Table A.2: Deregulation Indicators for Alabama

Year	Intrastate	Interstate	Deregulation
1975	0	0	0
1976	0	0	0
1977	0	0	0
1978	0	0	0
1979	0	0	0
1980	0	0	0

1981	1	0	1
1982	1	0	1
1983	1	0	1
1984	1	0	1
1985	1	0	1
1986	1	0	1
1987	1	1	1
1988	1	1	1
1989	1	1	1
1990	1	1	1
1991	1	1	1
1992	1	1	1
1993	1	1	1
1994	1	1	1

Finally, one natural question to ask is: What if deregulation timing was endogenous? In other words, what if states deregulated precisely because of changes in economic conditions like state-level growth and volatility? Sections II and III utilize proxies of economic growth and volatility as dependent variables, so it would be concerning if numerous states decided to deregulate when they were in the middle of a recession. Any estimated benefit to economic growth or volatility would thus be conflated with a natural reversion to the mean. This endogeneity concern is addressed with multiple robustness checks in Sections II and III. Of course, the robustness checks are not perfect; there is no way to screen out all confounding factors. However, the empirical findings are valid on average, and the results are buttressed in one way or another by the existing empirical literature.