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US Bank Geographical Expansion and Impact on Funding Costs

DRAFT
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Abstract: By incorporating staggered intrastate banking deregulation into a gravity model, this paper investigates the causal impact of intrastate geographical expansion on a bank's costs of interest-bearing liabilities. The focus of the analysis is on bank holding companies (BHCs) that expand solely within their home state. Our study finds that intrastate geographical expansion results in lower costs of funds and deposits. Furthermore, we identify three channels - market power, risk reduction, and agency friction - through which these cost savings are achieved. Our research shows that market power is a significant factor contributing to the cost reduction, as intrastate geographical expansion strengthens market power. Additionally, we find that the expansion of high-risk BHCs within states has a smaller impact on lowering costs compared to other BHCs. In addition, our findings indicate that the cost savings are diminished when BHCs expand into counties that have highly correlated environmental conditions and experience more natural disasters. Finally, we observe that the expansion of smaller BHCs with mild agency frictions has a larger impact on reducing deposit costs, but not fund costs, compared to other BHCs.

Keywords: Geographical expansion; Intrastate; Funding cost; Banking; Banking regulation

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1. Introduction

An important issue in banking is whether allowing banks to expand geographically negatively or positively affects their performance and riskiness as well as the communities in which they operate.¹ Historically, banks, unlike most firms, have been limited by state and federal laws to the extent to which they could expand geographically within the United States.² Over time, individual states not only differed among themselves regarding policies on the geographical restrictions initially placed on state banks but even individually on the timing when changing them as time passed. Once the federal government got involved in such restrictions after it started chartering national banks, it also changed its policy over time, eventually allowing state and national banks more leeway to engage in banking and branching within and across states. Finally, with the enactment of the Dodd–Frank Wall Street Reform and Consumer Protection Act in 2010, the federal government allowed banks to branch *de novo* nationwide by overriding state laws.

Numerous studies have examined the impact of the relaxation of state and federal laws on the geographical expansion of Bank Holding Companies (BHCs) through the acquisition of banks and independent banks (i.e., those banks (IBs) not belonging to BHCs) through mergers and acquisitions. The examinations have involved the effect of state and federal policy changes on the allowable expansion within states and across states on various bank outcomes and outcomes in the local communities experiencing greater access to local banking services. The state and federal deregulation policies that contributed to greater geographical expansion have been found to affect multiple outcomes such as economic growth (Jayaratne and Strahan, 1996; Morgan, et al., 2004; Rice and Strahan, 2010; Favara and Imbs, 2015; Spierdijk, Ijtsma, and Shaffer, 2021), entrepreneurship and creative destruction (Kerr and Nanda, 2009), income distribution and unemployment rates (Black and Strahan, 2001; Beck, et al., 2010), bank credit and innovative firms (Amore et al., 2013; Chava, et al., 2013; Cornaggia, et al., 2015; Black and Strahan, 2002; Kerr and Nanda, 2009; Hombert and Matray, 2017), bank risk and return (Black, Fields, and Schweitzer, 1996; Chong, 1991; Goetz, et al., 2016; Gropp, et al., 2019; Deng, et al., 2021; Meslier, et al., 2016; Goetz, et al., 2013), bank performance (Swamy, et al. 1996; Jayaratne and Strahan 1996 and 1997; Kroszner and Strahan 1999; Stiroh and Strahan, 2003; Dick, 2006; Li, et al., 2021; Levine, et al., 2021), bank efficiency (Acharya et al., 2011), income insurance (Demyanyk et al., 2007), racial inequality (Levine, et al., 2014). These studies are important because they provide evidence as to whether the regulations were excessive and thereby distorted bank behavior and, more generally, economic activity and growth.

¹ A similar issue that arises is the effects when banks contract geographically via banks or branches, which is beyond the scope of our paper. However, see Nguyen (2019) for an interesting study on the impact of branch closing on local access to credit.

² In 1837, the Supreme Court affirmed the constitutionality of State bank charters. Our paper does not cover “private” banks, which are unincorporated banks without any association with the state or federal governments that corporate charters implied, in the early years (Board of Governors of the Federal Reserve System, 1941). Importantly, according to Felsenfeld (1993, page 8), “[f]or some sixty -five years after the revolution, the only way a bank could be created in corporate form was by an act of a state or federal legislature.”

Of the 27 studies, three focus on the intrastate geographical expansion of banks, twelve concentrate on interstate expansion, and twelve consider intrastate and interstate diversification. Also, six studies employ a deregulation expansion index in the empirical analysis. Furthermore, to account for the potential endogeneity of the geographical expansion of banks, nine studies rely on an instrumental variable approach in estimating the effect of such diversification on various outcomes. Our study focuses on intrastate expansion, but unlike the three studies mentioned above that do the same, we consider only BHCs operating within a single state (intrastate BHCs), rely on an intrastate deregulation index, and use an instrumental approach to address a potential endogeneity problem associated with geographical expansion.

An important issue in determining the impact of the geographical expansion of BHCs via banks and branches on various outcomes is that the measure of expansion must be an exogenous driver of the outcomes. One must therefore be sure not to fail to identify and include factors that may drive the BHCs' decision to expand geographically, compromising the ability to identify the causal effects of the expansion measure. An important factor affecting a measure of geographical expansion is the federal and state government restrictions on the entry of BHCs through subsidiary banks and their branches into the different states and on the expansion within individual states. Some earlier studies failed to address the endogeneity concern in their empirical work.³ A typical approach to empirically assessing the impact of a change in deregulation at either the intrastate or interstate level on various outcomes was the inclusion of dummy variables indicating changes from stricter to looser regulation.

Recently, Levine, et al. (2021) provided an alternative approach by constructing a staggered measure of geographical expansion and addressed the endogeneity issue associated with it with a novel research design based on a gravity model that builds on Goetz, Levine, and Levine (2013 and 2016).⁴ Levine, et al. (2021) construct instruments for their expansion measure based on three plausibly exogenous sources of variation in the ability, cost, and customer base of a BHC to expand its bank/branch network geographically: (1) the interstate bank (and branch) restrictions on entry, which is a measure of ability to expand, (2) geographical distance from a BHC in one state to another state in which it is allowed to expand, which is a measure of cost, and (3) the population of the location in which a BHC is allowed to expand relative to its current location, which is a measure of the potential enlargement of the customer base. As regards the first factor, the authors obtain year-by-year information from 1986 until 2007 on the barriers to, or the ability of, BHCs in each state establishing banks/branches from 1986 through 1994 and banks/branches from 1994 through 2007 in every other state. States with lower entry barriers allow a BHC to add more banks/branches and their associated deposits to its existing banks/branches and deposits if it expands into such states. As regards the second factor, the shorter the distances between a BHC headquartered in one state and other states into which it is allowed to expand, and thus the lower the expansion costs, the greater the incentive for a BHC in one state to add more banks/branches and their deposits to its existing banks/branches and deposits by expanding into such states, so that

³ Commenting on this issue, Huang (2008, p. 703) states “[t]he endogeneity problem could be one of the reasons previous studies tend to find a correlation between deregulation and growth acceleration.”

⁴ Levine, et al. (2021) point out that Goetz et al. (2013 and 2016) ignore interstate branch deregulation in their strategy for identifying shocks to the geographic expansion of banks, so their approach ends in 1994.

the degree of expansion is expected to decline with distance.⁵ The third factor, relative population gained through expansion, provides an incentive to expand by enlarging the customer base. The main empirical result of Levine, et al. (2021) is that, on average, geographical diversification across states by BHCs lowers their costs of interest-bearing liabilities, and the authors focus separately on the cost of funds and deposits.

The main contribution of our paper is to extend the novel and important work of Levine, et al. (2021) to intrastate expansion. Like most studies, their study focuses on the interstate expansion of banks. However, when studying the expansion of banks into other states, different states have different restrictions on intrastate expansion once within the states. This situation means there could be greater bank or branch expansion into new states if, after entry, the state permits further expansion by the interstate bank via the establishment of new banks or branches. Thus, without considering the intrastate restrictions, one doesn't know the extent to which an increase in a bank's share of deposits through expansion, for example, was due solely to entering new states or further expansion after entering. One must therefore consider intrastate regulations. Also, the focus on intrastate expansion is motivated by the degree of the geographical dispersion of BHCs from 1987 to 2021. While the number of BHCs ranges from a low of 3,480 to a high of 5,918 over the period, the percentage of BHCs that operate banks in only one state ranges from a low of 96 percent to a high of 99 percent (see Table A8, Panel A). The number of BHCs operating branches of subsidiary banks in only one state ranges from a low of 82 percent to a high of 98 percent (see Table A8, Panel B). Thus, most BHCs conduct their banking operations in only one state over this period.⁶ Also, the percentage of BHCs operating banks in more than two states is equal to or less than one percent throughout the period, while those operating branches in more than two states are equal to or less than three percent. These figures indicate relatively little geographical expansion across states compared to within states. Also, there is even relatively little geographical expansion across three or more states compared to only two states.

Furthermore, regarding the two basic types of BHCs: Multi-Bank (MBHCs) and One-Bank (OBHCs), the highest percentage of the MBHCs operating branches in more than two states occurred in 2021 and was only 24 percent of the 202 MBHCs. The highest percentage of the OBHCs operating branches in more than two states occurred in the same year and was only 5 percent of the 3,278 OBHCs. Once again, there was relatively little geographical expansion in more than two states of the two types of BHCs (see Tables A6 and A9, Panels A and B).

Also, in conducting our analysis, a contribution is constructing a new index of intrastate banking and branching restrictions used in the gravity model to assess whether the same results found by Levine, et al. (2021) for interstate expansion hold for intrastate expansion. The index is based on earlier research by Mengle (1990), Barth and Brumbaugh (1993), Swamy, et al. (1996), and Demyanenko et al. (2007). Furthermore, another contribution is documenting with descriptive information that the evolution of the geographical expansion of banks involved far more intrastate expansion than interstate expansion, and the interstate expansion was greater than indicated and captured in previous studies due to the focus on more recent data. Including more historical

⁵ Furthermore, Levine, et al. (2021) state they use distance as an exogenous source of variation in how interstate bank deregulation differentially affects BHCs in a state.

⁶ Kroszner and Strahan (1999) also state that their empirical tests are based on the timing of **intrastate** branching deregulation because it has a much greater economic impact than the other forms of branching deregulation.

information regarding bank geographical expansion due to regulatory changes may well mean that one necessarily understates the impact of the total expansion (the sum of the earlier and more recent expansion) on various outcomes examined.

Our empirical results are based on examining the impact of intrastate expansion on the cost of total interest-bearing liabilities, which includes deposits. The reason for this focus is that total interest-bearing liabilities account for 91% of total liabilities, while deposits account for about 59% of total liabilities.⁷ We examine total interest-bearing liabilities and deposits separately in our analysis. Notably, Deng and Elyasiani (2008), Goetz et al. (2016), and Cortes and Strahan (2016) find that geographic expansion reduces bank risk, whereas Berger and DeYoung (2001), Berger et al. (2005), Goetz et al. (2013) find that geographic expansion intensifies agency frictions. In addition, Berger et al. (1998) argue that market power exercised by firms in concentrated markets allows them to minimize costs without exiting the industry. An issue that arises is whether bank risk, market power and agency frictions are the three channels through which geographical expansion affects the costs of funds and deposits. Therefore, we discuss and provide empirical evidence to support three key theoretical predictions in the case of intrastate geographical expansion: 1) geographical expansion improve BHC's market power and thereby lower funding costs, 2) geographical expansion provides the opportunities for lowering risk associated with physical locations, as an example, natural disasters, and therefore lower funding costs, 3) geographical expansion intensify agency friction and increase funding costs. Our results show that intrastate geographical expansion increase market power as the first channel. Overall, geographical expansion lowers the costs of funds. However, the impact is mitigated when BHCs expand into counties that have highly correlated natural conditions with the home counties and more disasters as the second channel. For the third channel, the expansion of smaller BHCs (i.e., with mild agency frictions) has a significantly larger impact on reducing the cost of deposits but not the cost of funds than other BHCs.

Also, following Hannan (1997), we decompose the measure of expansion, the Herfindahl–Hirschman Index (HHI), into two terms, one that depends on the variance of their deposit shares and one that depends on the number of counties. The first term is the contribution of HHI to the dispersion of deposit shares away from equality, the “inequality effect.” The second term is what HHI would be if the deposit shares of all counties were equal, the “number of counties effect.” The coefficient on the first term indicates that HHI increases with the variance of deposit shares. An increase in variance, moreover, increases HHI more the greater the number of counties. Also, the coefficient on the second term indicates that an increase in the number of counties lowers HHI if the variance is less than the reciprocal of the number of counties squared and raises HHI if the variance is greater than the reciprocal of the number of counties squared. Both coefficients are significantly positive but significantly different from one another. This finding means using HHI as an explanatory variable inappropriately constrains share inequality and the number of counties to be equal in explaining the cost of funds and deposits.

We perform three additional tests as robustness checks on our main results. First, reverse causality is possible as the funding and deposit costs may be driving the intrastate geographical restrictions on banking and branching. Our results indicate this is not the case. Second, our empirical results indicate that intrastate expansion reduces the cost of both funds and deposits, but significantly

⁷ These figures are for 2022 from the Federal Deposit Insurance Corporation (FDIC).

larger reductions than those reported by Levine, et al. (2021) for interstate expansion. This result suggests large benefits to BHCs expanding geographically intrastate even without expanding interstate, apart from potentially being part of the expansion effect found by them. The latter point means there is the potential that BHCs in one state allowed to expand into other states may affect the degree to which BHCs in those states can enlarge their deposit share. Thus, given that interstate deregulation may affect the impact of intrastate deregulation on within-state expansion by BHCs, we include both types of deregulation changes in our gravity model to determine whether this is indeed the case, something not done in previous studies of intrastate expansion. Third, there are a variety of control variables used by lots of related studies. Therefore, we use Lasso to determine which control variables from several related studies significantly enter the regressions. We find that some variables that are found to be significant in other studies are not found to be significant in our regressions. However, our primary results remain unchanged despite the difference in control variables.

The remainder of our paper proceeds as follows. In the next section, we provide an overview of the evolution of the restrictions placed on bank holding companies and banks regarding expanding geographically within and across states. This includes information on differences in restrictions among the states, how they made changes over time, and how the restrictions at the federal level also changed over time and eventually overrode state laws. The third section provides descriptive information on how the structure of banking changed over time. The focus shows how BHCs were allowed to expand by state and federal laws through controlling banks and operating branches within and across states over time. In the fourth section, we discuss our research design and present and discuss our empirical results. The last section contains our conclusions and suggestions for future research.

2. Historical Regulatory Evolution Governing Bank Holding Company, Bank, and Branch Geographic Expansion Intrastate and Interstate

Historically, banks, unlike most firms, have not been free after choosing the location of their headquarters to expand geographically via branches anywhere they wish until recently. Instead, state and federal laws determined where banks could expand their geographical footprint. In the years before the Civil War, the states chartered banks and received fees for granting the charters. Also, the states often owned or purchased bank shares that entitled them to share in bank profits and to receive tax revenue generated by banks. This source of influence and added revenue incentivized the states to restrict competition by limiting the geographical expansion of banks. Some states even passed "unit banking" laws that further restricted competition by preventing banks from having branches (Kroznier and Strahan, 1999).⁸ Since no chartering fees were received from out-of-state banks, states also had the incentive to prohibit interstate banking. As a result, branch banking was not common in the United States before the Civil War (Board of Governors of the Federal Reserve System, 1932).⁹ Indeed, in a study of all banks between 1782 and 1861,

⁸ In Texas (1845) and Arkansas (1846) banking was prohibited by the State constitution, though the prohibitions did not affect unincorporated, or private, banks (Board of Governors of the Federal Reserve System, 1932).

⁹ The earliest banks with branches in several states were the First (1792-1812) and Second (1816-1836) Banks of the United States, both set up by the Federal Government. The charters for both ran for twenty years and were not renewed.

Weber (2006) found that only 54 such banks out of 2,332, or 2 percent, that existed at one time or another had branches.¹⁰

The National Banking Act of 1864 established the Office of the Comptroller of the Currency (OCC), which also began to charter banks, referred to as national banks. Most state banks, and even the branches of those banks with them, before the Civil War, converted into national banks, and the Act was interpreted as forbidding branching by national banks. Also, even for state banks, "... branching was not an important issue ..." at the time (Mengle, 1990, p. 5). Since the Act imposed a ten percent tax on note issues of state banks, and note-issuing was generally used to attract funds for loans, the tax made such note-issuing uneconomical. As a result, the branches used to distribute the notes were mainly closed (Sedlacek and Hallstrom, 1995).¹¹

Moreover, even in states where banks had branches, they were typically confined to the town or city of a bank's headquarters. The communication technology and transportation facilities provided little incentive for banks to expand geographically via branches. As of 1900, there were 12,427 banks, but only 87 banks with 119 branches, or less than one percent (Board of Governors of the Federal Reserve System, 1941).

In the early 1900s, there was a renewed interest in branch banking, and by 1910, eight states of the then forty-six states at the time had approved statewide branching, and three states had approved branching in limited geographical areas. However, nine states were unit banking states and thus prohibited branching. The remaining states had no branching laws. Not surprisingly, unit banks opposed branch banking, and by 1929 more states (22) banned branching than had done so in 1910 (Mengle, 1990). Of course, national banks wanted the same branching privileges as state banks. However, in 1911, when the Comptroller of the OCC requested an opinion from the Attorney General regarding branching by national banks, the response was they were not allowed to do so. The Supreme Court affirmed this decision in 1924, holding that national banks did not have the right to branch unless the U.S. Congress specifically said otherwise.

The U.S. Congress acted on the issue in 1927 by passing the McFadden Act, which allowed national banks to branch within their city boundaries if state banks were allowed the same or more liberal privileges. Then, in 1933, the McFadden Act was amended, allowing national banks to branch to the same extent as state banks, but precluded interstate branching by limiting branching to the state where the national bank was situated. Almost all of the action on branching since then occurred at the state level and involved intrastate banking until the 1980s. In particular, the number of states allowing statewide branching increased to 21 in 1979 from 18 in 1939, while the number of states prohibiting branching declined to 12 from 14 over the same period. The remaining states allowed branching within limited geographical areas (Mengle, 1990). As of 1988, only two states

¹⁰ In 1800, there were 16 states in the United States, and they were home to 24 banks, including four in Connecticut and New York and five in Massachusetts. By 1820, the number of state banks had increased to 266, and they operated 66 branches in 23 states, the District of Columbia, and the territories that would become Michigan and Missouri (Todd, 2018).

¹¹ It should be noted that the powers of national banks from their creation were more circumscribed than those of state banks, especially as regards the separation of banking and commerce. However, the FDIC Improvement Act of 1991 reduced the potential powers of state banks to correspond more closely with those of national banks (Felsedfel, 1993).

had unit banking laws, while 28 states allowed statewide branching.¹² In early 1992, all states permitted at least limited branching, while the number of statewide-branching states had increased to 38 (Amel and Liang, 1992). By 2000 almost all the states and Washington, D.C. (50) had allowed intrastate branching via merger and acquisition, and nearly all (50) had allowed interstate banking.

As regards bank holding companies (BHCs), they were relatively unimportant in the banking industry before the twentieth century (Felsenfeld, 1993).¹³ BHCs raised an issue because the McFadden Act, as amended, did not address the interstate banking powers of BHCs. As a result, before the Bank Holding Company Act (BHCA) of 1956, banks could form or reincorporate themselves as multi-bank holding companies and hold separately incorporated banks in different states to engage in interstate banking without running afoul of the interstate banking restrictions.¹⁴ However, Section 3(d) of the BHCA (commonly known as the Douglas amendment), the first federal BHC legislation, prevented BHCs from acquiring banks in other states unless those states permitted such acquisitions.¹⁵ Yet no state allowed such acquisitions at the time, which prevented BHCs from expanding into other states (Omarova and Margaret, 2012).¹⁶ However, the BHCA only applied to BHCs owning multiple banks.

In 1970, the Bank Holding Company Act was amended to bring one-bank holding companies in addition to multi-bank holding companies under federal regulation. However, the amendment changed the definition of "bank" to include institutions that accept demand deposits and extend commercial loans. As a result of this definitional change, a new means to avoid the Bank Holding Company Act restrictions was the establishment of so-called "nonbank banks." These entities either extended commercial loans or accepted demand deposits but did not engage in both activities, effectively able to avoid the regulatory limitations of the BHCA or the geographic restrictions of the "Douglas Amendment." By the mid-1980s, firms like General Electric, Textron, ITT, Gulf & Western, John Hancock, Prudential Bache, American Express, Merrill Lynch, Dreyfus, Household, Beneficial, Sears Roebuck, JC Penney, McMahan Valley Stores, Bankers Trust Corp., Bank of Boston Corp., and others had all established nonbank banks. It was not until 1987 that the Competitive Equality Banking Act changed the definition of a "bank" to include any federally insured institution as a bank, grandfathered existing nonbank banks (while limiting their growth), and prohibited the formation of new nonbank banks, thereby eliminating the "nonbank-bank" loophole (Barth and Sun, 2019).

¹² In 1987, a federal appeals court ruled that the OCC could allow national banks to branch statewide in those states in which state-chartered thrift institutions were allowed this privilege. Many states responded to this ruling by relaxing branching laws for state-chartered banks to establish equal treatment with national banks (Amel and Liang (1992).

¹³ It is reported that there were 28 BHCs in 1929 (Felsenfeld, 1993).

¹⁴ According to Omarova and Margaret (2012), the political target of the BHCA was Transamerica Corp., which in the 1950s controlled the Bank of America and other banks in Arizona, California, Nevada, Oregon and Washington, and also owned several non-banking enterprises. Moreover, it allegedly begun planning to continue expanding its banking services to become a truly nationwide presence.

¹⁵ The McFadden Act by limiting bank branching and the Douglas Amendment by limiting the spread of BHCs were important for sustaining small banks in the country.

¹⁶ According to Amel and Liang (1992), at the time there were seven multistate BHCs grandfathered under the 1956 law.

In 1982, two significant developments occurred.¹⁷ First, the 1982 Garn-St Germain Depository Institutions Act permitted out-of-state banking organizations to acquire certain large, troubled commercial banks, while the Competitiveness Equality in Banking Act of 1987 authorized the FDIC to arrange interstate takeovers of institutions with assets of more than \$500 million (Hills, 2007).¹⁸ Second, the situation regarding interstate expansion changed when Massachusetts enacted legislation authorizing regional bank acquisitions with a reciprocity requirement.^{19,20} In 1983, Connecticut and Rhode Island followed with similar legislation. This led to regional reciprocal mergers in New England. However, Citicorp and Northeast Bankcorp challenged the Massachusetts and Connecticut statutes as unconstitutional. In 1985, the Supreme Court upheld state laws that established regional reciprocal banking arrangements as constitutional. The decision validated actions taken by states that enacted regional banking statutes that did not allow entry from states outside their regions at any time. As a result, one-third of the states enacted such statutes, with virtually all requiring reciprocity (Gray, 1986, page 288).²¹

One of the interesting regional compacts was the formation of the Southeastern Regional Banking Compact, passed by most southern states' legislatures between 1984 and 1985.²² The goal of the Compact was to allow southern banking companies to combine with other banking companies in the South to gain financial strength and size sufficient for them to compete more effectively in the national banking arena against the stronger money-center banks.²³ The goal was achieved to some degree insofar as several southern banking companies did attain greater size and scope to become effective competitors of the money center banks (Hills, 2007).

The first significant southern banking combination after the Compact was the merger between Trust Company of Georgia and Sun Trust of Florida in June 1985.²⁴ The new Sun Trust acquired

¹⁷ It might be noted that after the Supreme Court held that a national bank could export the interest rate of its home state nationwide, in 1980, South Dakota was the first state to invite out-of-state holding companies to establish national banks in South Dakota and to liberalize its usury laws (Felsenfeld, 1993).

¹⁸ The first cross-industry, cross-country takeover occurred in 1982 when the Federal Reserve approved the acquisition of Fidelity Federal Savings and Loan Association of San Francisco by Citicorp of New York ((Coyne, 1983).

¹⁹ In 1975, Maine was the first New England state to authorize out-of-state BHCs to acquire Maine banks, effective in 1978, so long as Maine banks could enter the other jurisdiction (Gray, 1986). However, there was no reciprocal state at the time so the reciprocity requirement was later removed. In 1976, Alaska followed Maine's lead with a statute of its own (Felsenfeld, 1993).

²⁰ In 1982, Federal law allowed BHCs to acquire banks outside their home states when the target banks were in financial distress under FDIC supervision. "Furthermore, as a result of the Savings and Loan ("S&L") crisis in the 1980s, state legislatures increasingly turned a blind eye to interstate branching restrictions to allow for acquisitions of insolvent banks and thrifts by out-of-state banks and BHCs" (Omarova and Margaret, 2012, p. 123, footnote 33). Studies of interstate expansion do not appear to have taken into account such acquisitions.

²¹ The states (year in parenthesis) include Connecticut (1985), District of Columbia (1986), Florida (1985), Georgia (1985), Idaho (1985), Illinois (1986), Indiana (1986), Maryland (1985), Massachusetts (1984), Minnesota (1986), Missouri (1986), North Carolina (1984), Oregon (1985), South Carolina (1985), Tennessee (1985), Utah (1985), and Virginia (1985) (see Gray, 1986).

²² The member BHCs had to have their principal place of business in a Compact state and had to have total deposits in the Compact states more than 80 percent of the total deposits of BHC-owned banks.

²³ According to Hills (2007, p. 62, footnote 19), "[as] of June 30, 1985, Citicorp, the largest bank holding company in the country, with assets of almost \$160 billion, was nearly ten times the size of the largest in the South, with assets of only \$16.9 billion."

²⁴ According to Hills (2007, p. 73, footnote 66), "[t]his merger, announced in November of 1984, was the only significant combination that was both announced and approved by banking regulatory authorities before the Supreme Court ruling in June 1985."

the Third National Bank of Tennessee in December 1986. The second merger was between Wachovia of North Carolina and First Atlanta of Georgia in June 1985. Other combinations followed. First Union National Bank of North Carolina acquired Atlantic Bancorp of Florida in June 1985, Southern Bancorp of South Carolina, and First Railroad and Banking Company of Georgia in 1986. First Union then turned to Florida and acquired several other banking companies, including Florida National Bank in 1989 and Southeast Bancorp in 1991. It did not stop there. First Union acquired banks in Virginia, savings and loans in Georgia, South Carolina, and Washington, D.C. By the end of 1993, it had become the ninth largest holding company in the country, outranked in the South only by North Carolina National Bank Corp. (NCNB), subsequently NationsBank. NCNB acquired Trust Company of Florida in 1972 and First National Bank, Gulfstream Bank, Exchange Bank and Trust Company, and the Downtown Bank of Miami in 1982. In 1988, NCNB reached outside the southeast to acquire First Republic Bank Corp., the largest banking organization in Texas (Hills, 2007). These developments indicate that most of this particular interstate expansion was likely done by a few of the biggest BHCs, suggesting size heterogeneity in BHC expansion.

The subsequent significant development that sped the consolidation of the banking industry was the enactment of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994.²⁵ The law overrode and pre-empted the various states' interstate banking laws and allowed for full interstate banking for the first time, effective July 1, 1995. However, an acquiring BHC was not permitted to control more than 10 percent of nationwide deposits, or 30 percent of deposits in the state entered, among other limitations. Also, BHCs could convert their existing interstate banks into branches as of September 1995. Independent banks, moreover, could branch interstate by merging with other banks across state lines. In deference to the states, the federal law permitted states to "opt-out" of interstate banking by merger before June 1997. States could also authorize such branching earlier ("opt-in").²⁶

Moreover, interstate branching could be accomplished by acquiring or establishing a de novo branch in another state. However, branching through the acquisition of an existing branch or on a de novo basis may only occur if expressly permitted by the state's law where the branch is or will be located. Once a bank has established branches in another state, it may only establish and acquire additional branches in that state to the same extent as other banks. As of 1995 and some years after, there were no unit banking states, and several states permitted limited bank mergers/acquisitions and branch banking. The remaining states, plus the District of Columbia, allowed full-scale intrastate branching.

Twenty-four states adopted interstate banking through merger/acquisition between 1994 and 1996, and twenty-five adopted it on June 1, 1997. Only two states, Texas and Montana, opted out by that deadline, but they subsequently adopted interstate branching by merger in 1999 and 2002,

²⁵ At year-end 1994, there was only one remaining significant regional banking area, which was the Southeastern Regional Banking Compact.

²⁶ In 1999, the Gramm-Leach-Bliley Financial Modernization Act repealed provisions of the Glass-Steagall Act of 1933 and the Bank Holding Company Act of 1956 to allow existing bank holding companies to acquire full-service securities firms and insurance companies, and to allow securities firms and insurance companies to acquire a bank (and thereby become a financial services holding company).

respectively. Interstate branching via de novo establishment had to be opted into specifically. As of 1997, only 13 states allowed de novo; by 2005, 22 did (Aguirregabiria, Clark, and Wang, 2016).

Lastly, de novo branching across state lines remained the sole prerogative of individual states until the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010. The Act modified the federal statute governing de novo interstate branching by banks. As a result, as of July 22, 2010, a bank was authorized to open its initial branch in a host state by establishing a de novo branch at any location at which a bank chartered by the host state could establish a branch. As of 2021, there were 4,336 banks and 76,280 branches, and 81 percent of the banks were operating these branches.

Appendix 1 provides descriptive information on how the structure of banking changed over time. The focus shows how BHCs were allowed to expand by state and federal laws through controlling banks and operating branches within and across states over time.

3. Data and Variables

3.1 Sources

We use financial, structural, and demographic data for intrastate BHCs and their subsidiary banks and branches to assess the impact of geographic expansion on a BHC's funding and deposit costs. We collected quarterly consolidated balance sheets, income statements, and supporting information from the FR Y-9C reports for each domestic BHC. Also, we collected quarterly bank-level balance sheet and income data from the "Reports of Condition and Income" (call reports). The call reports also identify the BHC that holds at least 50 percent of a bank's equity stake (RSSD9364), which we use to link bank subsidiaries to their parent BHCs. We use branch-level information on the amount of deposits, physical location, and affiliated banks as of June 30 of each year from the FDIC's Summary of Deposits database. We linearly interpolate the annual branch deposit data to quarter-level data. By linking these three datasets, we measure the BHC's dispersion of deposits across counties within the home state of each BHC.

The initial sample included all publicly listed BHCs in the FR Y-9C reports from the second quarter of 1987 through the last quarter of 2007 operating within the 48 contiguous states and the District of Columbia. We excluded BHCs headquartered in Alaska and Hawaii. We also dropped BHCs with headquarters in South Dakota and Delaware since these two states changed laws to encourage the entry of credit card banks during the study period. We further dropped BHCs that relocated their headquarters to different states. The final sample consists of 761 unique intrastate BHCs and more than twenty thousand BHC-quarter observations from 1987Q2 to 2007Q4.

Table 1 shows the difference in the number of BHCs geographically expanding only in a single state (intrastate BHCs) versus those geographically expanding in different states (interstate BHCs) from 1987 to 2007. There were far more BHCs operating within a single state yearly than BHCs operating in two or more states. Also, there were far more BHCs operating in a greater number of counties than BHCs operating in states. Furthermore, the maximum number of BHCs operating via banks/branches in six or more counties over the period was 100 compared to 31 in the case of BHCs operating via banks/branches in six or more states. The comparative figures indicate greater geographical expansion by BHCs intrastate than interstate.

Table 1. Geographical Dispersion of Intrastate (Counties) and Interstate (States) Bank Holding Companies

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Intrastate	201	197	207	346	351	355	364	360	344	334	329	317	313	308	305	294	282	274	271	257	230
1	37	37	41	97	90	86	85	81	70	70	67	64	63	58	53	44	39	37	35	30	27
2	22	22	29	79	80	74	73	83	84	80	67	61	60	57	52	52	51	48	43	39	27
3	20	25	25	48	56	64	70	53	57	55	54	44	40	41	47	45	45	45	41	43	38
4	18	15	16	19	21	21	26	32	24	28	33	31	27	32	28	29	37	33	41	33	31
5	12	13	15	18	19	21	23	27	30	26	22	23	29	20	28	30	22	19	21	22	18
[6,10]	49	46	46	53	48	54	53	50	43	46	54	62	64	67	64	62	59	58	56	52	54
[11,20]	24	25	24	21	23	23	23	22	24	20	24	26	25	26	26	25	22	26	25	29	26
[20,30]	13	10	7	6	7	7	6	7	9	6	6	6	5	7	7	6	6	7	8	7	6
>30	6	4	4	5	7	5	5	5	3	3	2	-	-	-	-	1	1	1	1	2	3
Interstate	70	87	92	104	105	102	100	102	108	108	115	125	132	127	130	132	144	142	147	159	164
2	30	37	39	46	49	47	44	49	52	52	53	63	66	54	59	61	71	67	71	73	78
3	21	27	24	28	28	28	28	23	25	25	26	24	25	28	26	23	24	20	28	34	29
4	9	9	14	13	12	12	11	11	10	8	12	9	10	9	10	14	14	14	11	14	16
5	5	5	5	5	4	4	5	9	9	8	8	4	3	6	5	4	5	10	10	11	12
[6,10]	3	7	8	10	11	9	10	7	9	11	13	21	23	24	24	22	22	23	18	17	18
[11,15]	2	2	2	2	1	2	2	3	3	4	2	3	4	5	4	7	6	6	6	7	5
[16,20]	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	1	1	4
>20	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	1	1	2	2	2	2
Total	271	284	299	450	456	457	464	462	452	442	444	442	445	435	435	426	426	416	418	416	394
% Intrastate	74	69	69	77	77	78	78	78	76	76	74	72	70	71	70	69	66	66	65	62	58

3.2 Variable Construction

3.2.1 Geographical Expansion

We measure a BHC's intrastate geographic expansion as the cross-county dispersion of its bank branches, where we weight each branch by the percentage of the BHC's deposits held in that branch. Specifically, expansion across counties equals one minus the HHI of a BHC's deposits held in its branches across counties (including the county where the BHC has its headquarters). Thus, a higher value of 1-HHI indicates a more dispersed distribution of branches and deposits across counties within a state.

3.2.2 Funding and Deposit Costs

The measures of BHC funding and deposit costs are obtained from FR Y-9C reports. The cost of funds equals a BHC's total interest expense during a quarter divided by interest-bearing liabilities at the beginning of the quarter. The cost of deposits as a BHC's interest expense on domestic deposits during a quarter is divided by the stock of domestic deposits at the beginning of the quarter. Summary statistics for these two variables are provided in Table 2.

3.2.3 Intrastate Banking/Branching Deregulation Index

Our measure of the restrictions imposed on the ability of BHCs to expand within the states they are headquartered in is referred to as the Intrastate Banking/Branching Deregulation Index (IBDI). IBDI is based on Mengle (1990), Barth and Brumbaugh (1993), Swamy, et al. (1996), and Demyanenko et al. (2007). Since the four studies covered different periods, we rely on all four to obtain a measure for each year of our sample period, as shown in Appendix 2. Specifically, IBDI ranges from one to four for each state, with 1 indicating statewide branching, 2 indicating statewide branching through mergers and acquisitions only, 3 indicating limited statewide branching, and 4 indicating branching is prohibited. Although we provide information from 1910 to 2010, our sample period is 1987 to 2007.

3.2.4 Control Variables

Several control variables are included in our assessment of the impact of a BHC's intrastate geographic expansion on its funding and deposit costs. The variables are Total Assets, Capital/Assets, Return on Assets (ROA), and a measure of competitive pressures facing each BHC, which is the HHI of banking assets in each Metropolitan Statistical Area (MSA) in each quarter. Table 2 reports descriptive statistics of these variables, with intrastate and interstate BHC-quarter observations. To see if there are any differences between the characteristics of intrastate and interstate BHCs, we run Wilcoxon-Mann-Whitney tests and t-tests. The results indicate that with one exception that the means of the same variables are statistically different for the two groups. The exceptional variable is Cost of Funds, where only the Wilcoxon-Mann-Whitney test is significant at the 5% level. In general, the intrastate BHCs have statistically higher Costs of Deposits, Capital/Assets, and competitive pressure (MSA) at the 1% level. Also, they have statistically lower ROAs and Total Assets at the 1% level. Appendix 3 contains detailed definitions for all variables used in the various models employed in this paper.

Table 2. Summary Statistics for BHC Intrastate and Interstate Variables and Tests of Difference in Means

Variable	Interstate BHCs			Intrastate BHCs			WMW Test	t-test
	N	Mean	S.D.	N	Mean	S.D.	Value	Value
Cost of Funds	9,862	0.011	0.006	22,681	0.011	0.006	2.13**	-0.54

Cost of Deposits	9,862	0.010	0.006	22,680	0.011	0.006	9.20***	5.99***
Capital/Assets	9,862	0.083	0.019	22,684	0.086	0.032	4.70***	11.11***
ROA	9,862	0.003	0.003	22,684	0.003	0.003	-12.52***	-7.94***
Total Assets	9,862	8.522	1.710	22,684	6.388	1.082	-102.05***	-110.00***
Market Concentration	9,866	0.534	0.296	22,596	0.564	0.316	7.36***	8.10***

Notes. This table provides the following summary statistics for the key variables (see variable definition in Appendix 2) used in the analyses: the number of observations (N), the average value (mean), and the standard deviation for two groups of BHCs: Interstate and Intrastate. We also provide the value of Wilcoxon-Mann-Whitney test and t-test to compare variables between Interstate BHCs significantly and Intrastate BHCs. *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

4. Intrastate Expansion and Funding Costs: OLS Results

As a preliminary assessment of the relationship between geographical expansion and funding costs, we first estimate OLS regressions. The reduced-form model is specified as follows:

$$(\text{Costs})_{\text{bsct}} = \beta(1 - \text{HHI})_{\text{bt}} + \gamma X_{\text{bt}} + \delta_{\text{b}} + \delta_{\text{st}} + \varepsilon_{\text{bsct}} \quad (1)$$

Where the dependent variable, Cost_{bit} is the funding costs measured for BHC b headquartered in state s and county c in quarter t . The key variable of interest $1 - \text{HHI}$ denotes the extent to which bank holding companies b expands its branches across counties within its home state s over quarter t . HHI defined as the sum of the squared share of deposits held in different counties within a state. The capital-asset ratio, return to assets, and total assets, all measured at the beginning of a period, along with market concentration, are included as control variables and denoted by X_{bt} . Also included are BHC fixed effects, and state-quarter fixed effects, denoted by δ_{b} and δ_{st} , respectively. The BHC fixed effects account for unobserved, time-invariant differences across BHCs respectively. State-quarter fixed effects account for time-varying, state-specific traits, such as economic activity, tax, labor, and other economic policies at the state level. We also try to include county-quarter fixed effects to account for time varying, county-specific difference. However, the data fail to converge because of too many fixed effects. Therefore, we discard county-quarter fixed effects. The reported standard errors are heteroskedasticity robust and clustered at the state-quarter level.

As shown in Table 3, the OLS results indicate the association between intrastate geographical expansion and total cost of funds is insignificant. However, there is a relatively strong negative relationship between expansion and cost of deposits. Without addressing causality, the economic magnitudes are small. For example, the estimated coefficient in Column 1 indicates that a one-standard-deviation increase in $1 - \text{HHI}$ (0.457) reduces the total cost of funds by 1.28% ($=0.457 \times 0.028$), corresponding to 1.41 basis points given that the sample mean of the total cost of funds is 1.1 percentage points.

However, a potential issue arises in that both costs may be endogenous. First, reverse causality is likely to attenuate the OLS coefficient if high costs encourage geographical expansion. Second, omitted variables might drive both intrastate geographical expansion and funding costs of the BHC. We, therefore, address this issue by using instruments to isolate the causal impact of geographical expansion in the next section.

Table 3. OLS Results

Variable	Total Cost of Funds (1)	Cost of Deposits (2)
1-HHI(original)	-0.028 (0.021)	-0.046** (0.022)
Capital-asset ratio	-1.101*** (0.292)	-1.033*** (0.313)
Return on assets	0.219	0.417

	(1.582)	(1.577)
ln (Total assets)	-0.298***	-0.328***
	(0.008)	(0.008)
Market concentration	-0.219***	-0.222***
	(0.021)	(0.022)
MSA indicator	-0.231***	-0.222***
	(0.034)	(0.034)
BHC fixed effects	Yes	Yes
State-quarter fixed effects	Yes	Yes
Observations	22,437	22,434
R ² adjusted	0.475	0.494

Notes. This table shows the OLS regression results of the impact of 1-HHI on the Total Cost of Funds and Cost of Deposits without addressing endogeneity concerns. We find that the coefficient of 1-HHI entered significantly negative only in the case of the Cost of Deposits. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

5. Identification Strategy and Empirical Results

5.1 The Gravity-Deregulation Model to Address Endogeneity

We follow Levine, et al. (2021) in constructing an instrument for the geographic expansion of BHCs via banks and branches in counties within a single state. In the first step, the following gravity model is estimated:

$$\text{Share}_{bijt} = \alpha \ln \text{Distance}_{bij} + \beta \ln (\text{Pop}_{it}/\text{Pop}_{jt}) + \gamma \text{IBDI}_{st} + (\delta_i + \delta_j + \delta_t) + \varepsilon_{bijt} \quad (2)$$

where the dependent variable Share_{bijt} is the share of deposits a BHC b headquartered in county i within state s holds through its banks/branches in county j and quarter t , $\ln \text{Distance}_{bij}$ denotes the natural logarithm of geographic distance between the BHC b 's headquarters and the average location of the subsidiary banks/branches in county j (in miles) within state s , $\ln (\text{Pop}_{it}/\text{Pop}_{jt})$ is the natural logarithm ratio of the total population of BHC b 's headquarter's county i in state s to the total population of county j in quarter t , and IBDI_{st} is the intrastate banking/branching deregulation index in state s in quarter t , as described in the previous section. Home county fixed effects, foreign county fixed effects, and quarter fixed effects are denoted by δ_i , δ_j , and δ_t , respectively. We expect that a BHC is more likely to expand to a neighboring county as the cost of doing so is lower; thus we expect a negative coefficient estimate of α . Moreover, BHC may be more attractive to larger customer base comparing with home counties. Therefore, we expect a negative coefficient estimate of β . Lastly, we expect a BHC is more likely to expand when the state allows intrastate expansion. We expect a negative coefficient estimate of γ .

The deposit share that a BHC can receive in a certain county ranges from zero to one. We follow Papke and Wooldridge (1996, 2008) and employ a fractional logit model to estimate model (2). We also provide estimates using OLS with controlling for home-county, foreign-county, and quarter fixed effects to condition out all time-invariant features of each county. As shown in Table 4, the OLS results are consistent with those from the fractional logit model. In the subsequent analysis, to ensure the predicted value is bounded between zero and one, we use the results of the fraction logit model.

We only include BHC-quarter observations in which it is legal for BHC to expand intrastate. Column 1-3 of Table 4 report the results using the fractional logit model, respectively. Column 4-6 report the OLS regression without and with fixed effects, respectively. As expected, the distance has a significant negative effect on the deposit share, suggesting that a BHC is more likely to expand to a nearby county. Besides, the coefficient on the relative market size is negative and statistically significant at the 1% level, suggesting that BHCs are less likely to expand to relatively small counties. Furthermore, intrastate branching deregulation index has a negative effect on the deposit share, indicating that BHCs are more likely to expand when the state has a higher tolerance towards intrastate expansion.

Table 4. Zero-Stage Estimation of Deposit Shares Using the Gravity Model

	Share of Deposits					
	(1)	(2)	(3)	(4)	(5)	(6)
Ln (Distance)	-0.152*** (0.000)	-0.142*** (0.000)	-0.143*** (0.000)	-0.145*** (0.000)	-0.123*** (0.000)	-0.136*** (0.000)
IBDI	-0.021*** (0.001)		-0.010*** (0.001)	-0.004*** (0.001)	-0.014*** (0.001)	-0.014*** (0.001)
Ln (Pop i / Pop j)		-0.047*** (0.000)	-0.046*** (0.000)	-0.033*** (0.000)	-0.050*** (0.000)	-0.079*** (0.005)
Home County fixed effects					Yes	Yes
Foreign County fixed effects					Yes	Yes
Quarter fixed effects						Yes
Estimation Method	Fractional logit	Fractional logit	Fractional logit	OLS	OLS	OLS
Observations	476,260	476,260	476,260	476,260	476,260	476,260

Notes. This table shows the regression results of the share of intrastate BHC deposits on distance, an intrastate branching index, and population. The dependent variable is the share of deposits BHC b headquartered in county i holds in its branches in a “foreign” county j over the quarter t; ln(Distance) denotes the natural logarithm of the geographic distance between BHC b’s headquarter and the county j (in miles); ln(popit / popjt) is the natural logarithm of the ratio of the total population of BHC b’s home county i to the total population of the foreign county j in quarter t; and IBDI is the index of intrastate banking/branching restrictions in state s at time t. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

5.2 Two-stage Least Squares Regressions

In the second step, we first calculate the predicted a BHC’s deposit share in a specific county in each quarter based on the coefficient estimates of the fractional logit model from Column 3 of Table 4. We then construct the BHC-specific and time-varying instrumental variable of intrastate geographic diversification as one minus HHI based on the projected deposit shares, where we set the projected shares to zero for BHCs that are prohibited from intrastate expansion. Given the instrumental variable, the following two-stage least squares regression is estimated as follows:

$$(1 - \text{HHI})_{\text{bit}} = \beta_1(1 - \text{Predicted HHI})_{\text{bit}} + \gamma_1 X_{\text{bit}} + \delta_b + \delta_{\text{st}} + \varepsilon_{\text{it}} \quad (3)$$

$$(\text{Costs})_{\text{bit}} = \beta_2(1 - \text{HHI})_{\text{bit}} + \gamma_2 X_{\text{bit}} + \delta_b + \delta_{\text{st}} + \varepsilon_{\text{it}} \quad (4)$$

Equation (3) is the first stage in which the actual intrastate geographical diversification (1- HHI) is regressed on (1- predicted HHI) based on projected market share, with HHI defined as the sum of the squared share of deposits held in different counties within a state. In the second stage (Equation 4), measures of costs are regressed on the predicted value of intrastate geographical diversification from the first stage (Predicted (1-HHI)). $(\text{Costs})_{\text{bit}}$ is measured by total cost of

funds and cost of deposit as discussed in Section 4.2.2. The capital-asset ratio, return to assets, and total assets, all measured at the beginning of a period, along with market concentration, are included as control variables and denoted by X. Also included are BHC fixed effects and state-quarter fixed effects, denoted by δ_b and δ_{st} , respectfully.

The results from estimating Equation (3) are reported in Columns 2 and 4 in Part A of Table 5. The results from estimating Equations (3) in the second stage are reported in Columns 1 and 3 in Part A, while the reduced form results with the use of the instrumental variable are reported in Column 1 for the total cost of funds and Column 4 for the cost of deposits in Part B. Also, we report the signs and significance of the estimated coefficients of the control variables.

Table 5. Two-Stage Least Squares
Panel A. 2SLS Results

Variable	Total Cost of Funds (1)	First-Stage Regression (2)	Cost of Deposits (3)	First-Stage Regression (4)
1-HHI	-0.397*** (0.124)		-0.326** (0.129)	
1-HHI(predicted)		0.129*** (0.013)		0.129*** (0.013)
Capital-asset ratio	-1.027*** (0.293)	0.217** (0.093)	-0.960*** (0.315)	0.275*** (0.087)
Return on assets	0.047 (1.579)	-0.321 (0.633)	0.314 (1.571)	-0.238 (0.629)
ln(Total asset)	-0.238*** (0.021)	0.167*** (0.003)	-0.282*** (0.022)	0.167*** (0.003)
Market concentration	-0.211*** (0.021)	0.027*** (0.009)	-0.216*** (0.022)	0.027*** (0.009)
MSA indicator	-0.212*** (0.034)	0.042** (0.017)	-0.207*** (0.035)	0.042** (0.017)
BHC fixed effects	Yes	Yes	Yes	Yes
State-quarter fixed effects	Yes	Yes	Yes	Yes
Observations	22,437	22,437	22,434	22,434
R ² adjusted	0.475	0.830	0.494	0.830
F-test if excluding instruments		105.40		105.36

Panel B. Reduced Form Results

Variable	Total Cost of Funds (1)	Cost of Deposits (2)
1-HHI(predicted)	-0.051*** (0.016)	-0.042** (0.017)
Capital-asset ratio	-1.113*** (0.291)	-1.050*** (0.312)
Return on assets	0.174 (1.574)	0.391 (1.567)
ln (Total asset)	-0.304***	-0.336***

	(0.006)	(0.006)
Market concentration	-0.221***	-0.225***
	(0.021)	(0.022)
MSA indicator	-0.229***	-0.221***
	(0.034)	(0.034)
BHC fixed effects	Yes	Yes
State-quarter fixed effects	Yes	Yes
Observations	22,437	22,434
R ² adjusted	0.475	0.494

Notes. This table reports the two-stage least squares regression results of the effects of intrastate geographic expansion on banks' funding costs in panel A and the reduced form results in panel B. The dependent variable in column (1), Total cost of funds, is defined as the ratio of total interest expenses to interest-bearing liabilities at the beginning of a period; and the dependent variable in column (3), Cost of deposits, is equal to interest expenses on domestic deposits divided by interest-bearing domestic deposits at the beginning of a period. We take the natural logarithm of each cost measure. Columns (2) and (4) report the corresponding first-stage regression results, so the dependent variable is the endogenous variable, $1 - \text{HHI}$ of deposits across counties, defined as one minus the sum of the squared share of deposits held in different counties. The excluded instrument is $1 - \text{HHI}$ of deposits across counties (predicted), which is computed as follows: using the coefficient estimates from the gravity-deregulation model (column (3) of Table 4), we predict the share a BHC holds in a county, quarter, and year. Finally, we aggregate the information for each BHC at the BHC-quarter level and compute the HHI of deposits across counties (predicted). BHC controls include Capital-asset ratio, Return on assets, and Total assets are measured at the beginning of a period, along with market concentration using an MSA indicator. Bank holding company fixed effects and state-quarter fixed effects are included throughout the table. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

Unlike the OLS results in Table 3, the IV results indicate that geographic expansion significantly reduces a BHC's total funding and deposit costs. Although geographic expansion significantly reduces the cost of deposit using OLS, the IV results indicate the reduction is seven times as great. As shown in Columns 1 and 3 of Panel A of Table 5, $1 - \text{HHI}$ is negative and significant at the 1% level. The results are robust after controlling for bank size, leverage, profitability, and market concentration, including BHC fixed and county-quarter fixed effects. To illustrate the economic magnitude of the relationship between intrastate geographic expansion and funding cost, we consider a one-standard-deviation increase in the expansion variable. The coefficient in Column 1 of Panel A of Table 5 indicates that a one-standard-deviation increase in $1 - \text{HHI}$ (0.457) reduces the total cost of funds by 18.1% ($=0.457 \times 0.397$), corresponding to 19.9 basis points given that the sample mean of the total cost of funds is 1.1 percentage points. Also, the coefficient in Column 3 of Panel A of Table 5 indicates that a one-standard-deviation increase in $1 - \text{HHI}$ (0.457) reduces the cost of deposits by 14.8% ($=0.457 \times 0.326$), corresponding to 16.3 basis points given that the sample mean of the cost of deposits equals 1.1 percentage points.

5.3 Decomposition of HHI

Following Hannan (1997), HHI can be decomposed into two components as shown in Equation (5). One component is the contribution of HHI to the dispersion of deposit shares away from equality, the "inequality effect." The other is what HHI would be if the deposit shares of all counties were equal, the "number of counties effect." The coefficient on the first term indicates that HHI increases with the variance of deposit shares (V^2). Moreover, an increase in variance increases HHI more the greater the number of counties (N). Also, the coefficient on the second term indicates that an increase in the number of counties lowers HHI if the variance is less than the reciprocal of the number of counties and raises HHI if the variance is greater than the reciprocal of the number of counties. To assess the causal impact of the two separate components of HHI on the cost of funds and deposits, we estimate Equations (6) and (7).

$$HHI = \frac{V^2}{N} + \frac{1}{N} \quad (5)$$

$$V^2_{bit} = \beta_1(1 - \text{Predicted } V^2)_{bit} + \gamma_1 X_{bit} + \delta_b + \pi_{st} + \varepsilon_{bit} \quad (6)$$

$$(\text{Costs})_{bit} = \beta_2 \left(\frac{V^2}{N} \right)_{bit} + \beta_3 \frac{1}{N_{bit}} + \gamma_2 X_{bit} + \delta_b + \pi_{st} + \varepsilon_{bit} \quad (7)$$

As shown in Table 6, both coefficients are significantly positive but significantly different ($F(1, 20304) = 13.66$, $\text{Prob} > F = 0.0002$ for total cost of funds; $F(1, 20301) = 11.50$, $\text{Prob} > F = 0.0007$ for cost of deposits). This finding means using HHI as an explanatory variable inappropriately constrains share inequality and the number of counties to be equal in explaining the cost of funds and deposits. Yet, when both variables are subtracted from 1, as is done in the case of HHI, the results indicate each variable has a negative impact on the cost of funds and deposits. Furthermore, when HHI is small, the number of counties has a greater impact on market concentration, whereas when HHI is large, county size inequality plays a bigger role in market concentration.

Table 6. Decomposition of HHI

Variable	Total Cost of Funds	Cost of Deposits
V^2/N	0.217*** (0.027)	0.233*** (0.028)
$1/N$	0.128*** (0.026)	0.145*** (0.028)
Capital-asset ratio	-1.001*** (0.312)	-1.001*** (0.337)
Return on assets	-1.087 (1.695)	-1.144 (1.700)
$\ln(\text{Total asset})$	-0.283*** (0.008)	-0.311*** (0.008)
Market concentration	-0.210*** (0.021)	-0.216*** (0.022)
MSA indicator	-0.234*** (0.034)	-0.226*** (0.034)
BHC fixed effects	Yes	Yes
State-quarter fixed effects	Yes	Yes
Observations	21,192	21,189
R^2 adjusted	0.487	0.505
F-test if excluding instruments	1477.80	1479.7

Note: This table presents the 2SLS results after decomposing the HHI into two components: V^2/N and $1/N$, where V^2 measures share inequality and $1/N$ is the reciprocal of the number of counties. We find that both the components enter positively and significantly with the total cost of funds and deposits as outcome variables. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

5.4 Robustness Tests

5.4.1 Reverse Causality Test

A potential concern is that IBDI may be endogenous in that funding and deposit costs might be a driver behind the timing of intrastate banking/branching deregulation. States might pass laws reducing restrictions on the intrastate geographical expansion of BHCs to lower their bank funding and deposit costs. We follow Kroszner and Strahan (1999) and use a Weibull model to address the possibility of reverse causality.

$$\ln T_{it} = \beta_1 \text{Cost}_{it} + \text{State Controls}_{it} + \eta_{ij} + \varepsilon_{ij}, \quad (8)$$

where T is the expected time of statewide branching. Cost is the cost of funds or the cost of deposits. Following Kroszner and Strahan (1999), State Controls include SmallShare , CapitalDiff , Unemp , GSP , and Political Dummy . SmallShare is the percentage of banking assets in a state held by banks below the median size of banks in each state in each year. CapitalDiff is the capital-to-assets ratio of small banks minus that of large banks. Unemp is a state's unemployment rate and GSP is the gross state product of a state. Also, we include a political dummy variable, which is 1 if a state is Democratic, and 0 otherwise. η is the year-fixed effect. All covariates are constructed for each state i and each year t .

Table 7 reports the results of testing for reverse causality. The statistical significance of the cost of funds and deposits as explanatory variables indicated that reverse causality is not a problem.

Table 7. Robustness Test: Weibull Results

Variable	Ln (T)	
	(1)	(2)
Cost of Funds	195.12 (256.37)	
Cost of Deposits		119.10 (248.02)
Small Bank share	589.66** (212.49)	597.17** (215.09)
Capital Difference	34.36* (20.62)	33.31 (20.67)
Unemployment rate	0.15 (0.24)	0.14 (0.25)
GSP	0.00*** (0.00)	0.00*** (0.000)
Democratic State	-3.00*** (0.65)	-2.90*** (0.63)
Year fixed effects	Yes	Yes
State fixed effects	Yes	Yes
Observations	114	114

Note: We estimate the following Weibull hazard model: $\ln(T)_{ijt} = \beta_1 \text{Cost of Funds}_{it} + \text{StateControls}_{it} + \eta_{ij} + \varepsilon_{ijt}$, where T is the expected time of statewide intrastate deregulation. Cost of Funds is the cost of deposits and total cost of funds, measured by aggregating them at the state level. StateControls include SmallShare , CapitalDiff , Unemp , GSP , and Political Dummy . SmallShare is the percentage of banking assets in the state held by banks below the median size of banks in each state in each year. CapitalDiff is the capital-to-asset ratio of small banks minus that of large banks; Unemp is a state's unemployment rate; and GSP is the gross state product of a state. Democratic State is 1 if a state is Democratic, and 0 otherwise. η is year fixed effects. The suffix "i" stands for state i . Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

5.4.2 Interstate Deregulation Index

A potential issue that arises is that one BHC's intrastate expansion may be affected by another BHC's interstate expansion. So far, we have not examined the effect of interstate expansion on intrastate expansion. Yet, one BHC's expansion within its headquartered state may be affected by the expansion in the same state by a BHC headquartered in a different state. Whether this can happen depends upon interstate regulations. To empirically examine this issue, we rely on an interstate deregulation index used by Rice and Strahan (2010). More specifically, we re-estimate the gravity model in Equation (2) but include the interstate deregulation index, denoted by Inter-BDI. All the other variables included are the same ones in Table 5. The gravity model's estimation results are reported in Table 8, Panel A. The results for the same three variables used earlier, $\ln(\text{Distance})$, IBDI, and $\ln(\text{Pop } i / \text{Pop } j)$, have the same signs and significant levels. Regarding the coefficient of Inter-BDI, it is positive and highly significant. This result indicates that the least restrictive interstate regulations on geographical expansion, the less expansion within individual states. A BHC expanding into another BHC's home state reduces the degree to which the home BHC can enlarge its deposit share in its state due to the increased competition.

Table 8. Interstate Deregulation Index

Panel A. Zero-Stage Estimation of Deposit Shares Using the Gravity Model

	(1)	(2)	(3)	(4)
$\ln(\text{Distance})$	-0.152*** (0.000)	-0.143*** (0.000)	-0.146*** (0.000)	-0.136*** (0.000)
IBDI	-0.023*** (0.001)	-0.014*** (0.001)	-0.010*** (0.001)	-0.015*** (0.001)
Inter-BDI	0.002*** (0.000)	0.005*** (0.000)	0.007*** (0.000)	0.002*** (0.000)
$\text{Pop } i / \text{Pop } j$		-0.047*** (0.000)	-0.035*** (0.000)	-0.083*** (0.005)
Home county fixed effects			Yes	Yes
Foreign county fixed effects			Yes	Yes
Quarter fixed effects				Yes
Estimation Model	Fractional logit	Fractional logit	OLS	OLS
Observations	476,583	476,583	476,583	476,583

Panel B. Two-Stage Least Squares (Second-Stage Regression)

Variable	Total cost of funds	Cost of deposits
	(1)	(2)
1-HHI	-0.240*** (0.070)	-0.289*** (0.075)
Controls	Yes	Yes
BHC fixed effects	Yes	Yes
State-quarter fixed effects	Yes	Yes
Observations	21,911	21,908
R ² adjusted	0.493	0.511
F-test if excluding instruments	881.88	881.88

Notes. The panel A of this table shows the regression results of the share of intrastate BHC deposits on distance, an intrastate branching index, an interstate branching index and population. the dependent variable Share_{ijt} is the share of deposits BHC b headquartered in county i holds in its branches in a "foreign" county j over the quarter t ; $\ln(\text{Distance}_{bijt})$ denotes the natural logarithm of the geographic distance between BHC b 's headquarter and the county j (in miles); $\ln(\text{pop}_{it}/\text{pop}_{jt})$ is the natural logarithm of the ratio of the total population of BHC b 's home county i to the total population of the foreign county j in quarter t ; IBDI is the index of intrastate banking/branching restrictions in state s at time t ; and inter-BDI is the index of interstate banking/branching restrictions in state s at time t . Panel B reports the two-stage least squares regression results of the effects of intrastate geographic expansion on banks' funding. The dependent variable in column (1), Total cost of funds, is defined as the ratio of total interest expenses to interest-bearing liabilities at the beginning of a period; and the dependent variable in column (2), Cost of deposits, is equal

to interest expenses on domestic deposits divided by interest-bearing domestic deposits at the beginning of a period. The independent variable of interest is BHC intrastate geographic expansion (1-HHI), which is one minus the sum of the square of bank deposit shares across counties within a BHC's home state. (1-HHI) is instrumented by (1-predicted HHI) derived from the stage-zero gravity-deregulation model. The control variables are the same as those in Table 5. Bank holding company fixed effects and state-quarter fixed effects are included throughout the table. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

In Table 8, Panel B, we find that our main results remain unchanged after controlling interstate deregulation. The geographic expansion by a BHC within its home state significantly reduces the cost of funds and deposits.

5.4.3 Lasso Regression

The different studies examining the impact of banks' geographical expansion on various outcomes do not include the same control variables. We, therefore, include a variety of these many control variables in the same regression and use Lasso (a least absolute shrinkage and selection operator) to select the variables that enhance the prediction accuracy of our model. Variable definitions are in Appendix 2. The results are reported in Table 9 and do not change our main finding regarding the negative and statistically significant impact of intrastate expansion on the total cost of funds and the cost of deposits. However, many variables are selected to enter based on their statistical significance, while other variables are not selected. Interestingly, MBHCs have higher costs than non-MBHCs, and BHCs with greater percentages of full-service branches also have higher costs.

Table 9. Robustness Test: Lasso Results

Variable	Total Cost of Funds (1)	Cost of Deposits (2)
1-HHI (predict)	-0.330*** (0.115)	-0.271** (0.120)
Assets Growth	-0.008*** (0.001)	-0.007*** (0.001)
Total Loans / Total Assets	0.898*** (0.046)	0.938*** (0.047)
Ln (Total Assets)	-0.258*** (0.020)	-0.303*** (0.020)
Return on Assets	-0.839 (1.630)	0.060 (1.602)
Noninterest Profit	0.003 (0.011)	-0.008*** (0.003)
MBHC	0.121*** (0.010)	0.121*** (0.011)
National Banks (%)	0.046*** (0.017)	0.067*** (0.018)
Market concentration	-0.167*** (0.021)	-0.172*** (0.022)
Full-Service Branches (%)	0.125*** (0.042)	0.101** (0.043)
Noninterest income/Total operating income	-0.073 (0.060)	-0.082 (0.065)
Earning Assets Growth	0.004*** (0.001)	0.003** (0.001)

Capital-asset ratio	-1.030*** (0.393)	-0.981** (0.430)
MSA indicator	-0.262*** (0.034)	-0.257*** (0.034)
BHC fixed effects	Yes	Yes
State-quarter fixed effects	Yes	Yes
Observations	21,754	21,751
R ² adjusted	0.500	0.552
F-test if excluding instruments	115.51	117.96

Note: This table presents the LASSO results after including additional control variables based on selected earlier studies. Some control variables enter insignificantly; thus, we only include the significant control variables in the LASSO regressions. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

6. Channels

An important issue is identifying channels through which intrastate expansion reduces the cost of funds and deposits. As Levine, et al. (2021, p.2658) state, “What is missing from the literature is an assessment of the overall impact of geographic expansion on the costs of a bank’s interest-bearing liabilities, which account for about 90% of total bank liabilities....” They go on to point out that geographic expansion intensifies agency frictions and reduces bank valuations, which might put upward pressure on banks’ costs of interest-bearing liabilities. At the same time, they point out that geographic expansion reduces bank risk and potentially decreases the costs of issuing securities and raising deposits. While they examine interstate expansion, our focus is on intrastate expansion’s impact on the cost of a bank’s interest-bearing liabilities, which is also missing from the literature.

6.1 Market Power

Berger et.al (1998) argue that market power exercised by firms in concentrated markets allows them to minimize costs without exiting the industry. Banks present in areas with less competition have higher market power where they can be price setters in the deposit market and would incur lower interest expenses (Kumar, 2018). When banks are present in duopolistic local markets, they have competitive conduct as opposed to presence of banks in monopolistic markets (Coccorese, 2009). Therefore, the extent to which BHCs hold banks via branches in different market conditions impact their overall cost of funds. BHCs with branches spread across several markets may enjoy market power in several less competitive markets which in turn would help them exploit price setting behaviour and experience lower cost of funds. In this section, we explore whether market power serves as a channel through which geographic diversification affects cost of funds.

We follow Jiménez et al. (2013) to construct the capacity of a BHC to set a price above its marginal cost through the Lerner Index, see Appendix 4. Specifically, a Lerner index defines the difference between price and marginal cost expressed as a percentage of price. The Lerner index ranges from 0 and 1, with 0 being the case of perfect competition and 1 of monopoly power.

We estimate the Total Cost and use the estimated parameters to calculate the marginal cost. We substitute the values in the Lerner index formula to calculate the Lerner Index for BHC b in quarter t .

The results, as reported in Columns 1 and 2 of Table 10, show that the coefficients on bank geographic diversification are still positive and significant. The Lerner index with Total assets as output increases market power more through diversification as compared to Total Deposits as output. The results also suggest that bank geographic diversification leads to a greater market power, corroborating the market power channel.

Table 10. Market Power

Variable	Market Power (assets)	Market Power (deposits)
	(1)	(2)
1-HHI	0.532*** (0.171)	0.134* (0.081)
Controls	Yes	Yes
BHC fixed effects	Yes	Yes
State-quarter fixed effects	Yes	Yes
Observations	19,094	19,308
R ² adjusted	0.359	0.520
F-test if excluding instruments	80.31	85.57

Note: This table reports the second stage 2SLS results explaining market power. The dependent variables are market powers using either total assets (columns 1) or total deposits (columns 2) as denominator in calculating total costs. The independent variable of interest is BHC intrastate geographic expansion (1-HHI), which is one minus the sum of the square of bank deposit shares across counties within a BHC's home state. (1-HHI) is instrumented by (1-predicted HHI) derived from the stage-zero gravity-deregulation model. The control variables are the same as those in Table 5. BHC fixed effects and state-quarter fixed effects are included. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

6.2 Risk Diversification

Geographic expansion may lower bank risk and thereby potentially decrease the costs of raising funds and deposits (Levine, et al. (2021)). Since our results indicate that the cost of funds and deposits do decrease with intrastate geographic expansion, we examine whether this finding is related to a reduction in BHC's risk. Our approach uses natural disasters as a proxy for environmental risks a BHC may face. The impact of intrastate geographical expansion on funding costs should be mitigated when a BHC expand to a county with the environmental risks comoves more with its home county.

Specifically, we provide three measures of degrees to which expanding into a county will provide risk-reducing opportunities for a BHC. First, *Disaster Corr* measures the correlation of disaster measures (i.e. currency damage to property, number of people injured, and currency damage to crop, etc.) between a BHC's home county and foreign counties that this BHC establishes subsidiaries. For each quarter, we calculate the average correlation between a county's disaster measurement and those of other counties that where this BHC's banks or branches located using the monthly natural disaster data over the previous three years. For the second and third measurement, we summarize the total currency damage to properties and total currency damage to properties per capital in all expanded counties of a BHC in each quarter. The large of the three measurements, the fewer opportunities for lowing risk through intrastate geographic diversification. For each disaster entities, we construct a dummy variable to indicate higher level

of disaster correlations and damages and interact with 1-HHI to access the impact of intrastate geographical expansion on funding costs. The regression equation is as follows:

$$(\text{Costs})_{\text{bit}} = \beta_1(1 - \text{HHI})_{\text{bit}} + \beta_2 D_{\text{ct}}(1 - \text{HHI})_{\text{bt}} + \gamma X_{\text{bit}} + \delta_{\text{b}} + \delta_{\text{st}} + \varepsilon_{\text{bit}} \quad (8)$$

Where D_{ct} is one of the three county-time measures of the disaster levels. Other variables are defined the same as in Equation (3). The results in Table 11 show that intrastate geographical expansion reduces BHC funding costs less when the natural environment are highly correlated, and foreign counties with more natural disasters. Columns 1- 6 show that the coefficients of 1-HHI are all significantly negative at 1% level for both cost of funds and deposits. Column 4 shows the interaction between the correlation of disaster measures and 1-HHI are positively significant at 10% level in the case of cost of deposits. Column 2, 3, 5, and 6 show the interaction with the other two disaster measures are significant and positive. On average, intrastate expansion reduces BHCs' funding costs. However, the impact is mitigated when BHCs expand into counties that have highly correlated natural conditions with the home counties and more disasters.

Table 11. Risk Reduction

Variable	Total cost of funds			Cost of deposits		
	(1)	(2)	(3)	(4)	(5)	(6)
1-HHI	-0.402*** (0.093)	-0.312*** (0.059)	-0.211*** (0.078)	-0.368*** (0.097)	-0.194** (0.082)	-0.326*** (0.063)
(Disaster Corr)*(1-HHI)	0.031 (0.024)			0.043* (0.025)		
(PropertyDmg)*(1-HHI)		0.085*** (0.025)				0.099*** (0.025)
(PropertyDmgPerCapita)*(1-HHI)			0.114*** (0.021)		0.122*** (0.022)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
BHC fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,450	22,450	22,450	22,447	22,447	22,447
R ² adjusted	0.477	0.477	0.477	0.495	0.495	0.495
F-test if excluding instruments	29.67	10.26	132.93	29.67	132.93	10.26

Note: This table reports the second stage 2SLS results explaining funding costs. The dependent variables are the total cost of funds (columns 1, 2, and 3) and the cost of deposits (columns 4, 5, and 6). The independent variable of interest is BHC intrastate geographic expansion (1-HHI), which is one minus the sum of the square of bank deposit shares across counties within a BHC's home state. (1-HHI) is instrumented by (1-predicted HHI) derived from the stage-zero gravity-deregulation model. Disaster Corr, PropertyDmg, and PropertyDmgPerCapita are three dummy variables that equal one if the BHC's disaster measurements belongs to the top quartile of the entire sample, respectively, and zero otherwise. The control variables are the same as those in the previous tables. BHC fixed effects and state-quarter fixed effects are included. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

6.3 Agency Frictions: BHC Asset-Size Heterogeneity

Levine, et al. (2021), as noted above, point out geographic expansion intensifies agency frictions and reduces bank valuations, which might put upward pressure on banks' costs of funds and deposits. Jayaratne and Strahan (1998) also demonstrate that intrastate deregulation increases bank size. Regarding this point, Michael Hsu (2023), Acting Comptroller of the Currency, states "There

are limits to an organization's manageability. ... Enterprises can become so big and complex that control failures, risk management breakdowns, and negative surprises occur too frequently – not because of weak management, but because of the sheer size and complexity of the organization.” Since he indicates that big BHCs are far more likely to possess these characteristics than small BHCs, it seems that the big BHCs are subject to more intensified agency frictions than small BHCs. If so, BHCs of different asset-size may differentially affect the costs of funds and deposits.

To examine whether agency frictions are intensified for BHCs that have gotten bigger through geographic expansion compared to BHCs that have remained relatively small, we include a dummy variable for a big BHC and a dummy variable for a small BHC, both interacting with 1-HHI. We then re-estimate our primary model by including the two dummy variables that interacted with 1-HHI.

The results reported in Columns (1), (2), (4), and (5) in Table 12 indicate that, on average, the geographical expansion effect when interacted with big BHCs lowers the cost of funds and deposits less compared to all other BHCs, whereas the geographical expansion impact is increased when only small BHCs are compared to all other BHCs. When both big and small interactions are included in Columns (3) and (6), on average, the geographical expansion effect for big BHCs increases the cost of funds and deposits compared to medium-sized BHCs, whereas the expansion effect for small BHCs decreases the cost of funds and deposits compared to medium-sized BHCs.

Table 12. Asset-Size Heterogeneity

Variable	Total Cost of Funds			Cost of Deposits		
	(1)	(2)	(3)	(4)	(5)	(6)
1-HHI	-0.320*** (0.123)	-0.386*** (0.126)	-0.090 (0.178)	-0.239* (0.129)	-0.303** (0.131)	0.034 (0.189)
DummyBig * (1-HHI)	0.158*** (0.040)		0.176*** (0.041)	0.166*** (0.042)		0.185*** (0.043)
DummySmall * (1-HHI)		-0.066** (0.033)	-0.068** (0.033)		-0.090*** (0.034)	-0.093*** (0.034)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
BHC fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-quarter fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22437	22437	22437	22434	22434	22434
R ² adjusted	0.475	0.475	0.476	0.495	0.494	0.495
F-test if excluding instruments	70.17	100.29	12.46	70.17	100.29	12.46

Note: This table reports the second stage 2SLS results explaining funding costs. The dependent variables are the total cost of funds (columns 1, 2, and 3) and the cost of deposits (columns 4, 5, and 6). The independent variable of interest is BHC intrastate geographic expansion (1-HHI), which is one minus the sum of the square of bank deposit shares across counties within a BHC's home state. (1-HHI) is instrumented by (1-predicted HHI) derived from the stage-zero gravity-deregulation model. DummyBig and DummySmall are two dummy variables that equal one if the BHC's total assets belong to the top and bottom quartile of the entire sample, respectively, and zero otherwise. The control variables are the same as those in the previous tables. BHC fixed effects and county-quarter fixed effects are included. Robust standard errors are reported in parentheses, and *, **, and *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

7. Conclusions

The main contribution of our paper is to extend the novel and important work of Levine, et al. (2021) to intrastate expansion. Like most studies, their study focuses on the interstate expansion of banks. It is important to realize that when studying the expansion of banks into other states, different states have different restrictions on intrastate expansion once within the states. This

situation means there could be greater bank or branch expansion into new states if, after entry, the state permits further expansion by the interstate bank via the establishment of new banks or branches. Thus, for the majority of studies that do not consider the intrastate restrictions, one doesn't know the extent to which an increase in a bank's share of deposits, was due solely to entering new states or further expansion after entering. One must therefore consider intrastate regulations. Also, the focus on intrastate expansion is motivated by the degree of the geographical dispersion of BHCs. While the number of BHCs ranges from a low of 3,480 to a high of 5,918, the percentage of BHCs that operate banks in only one state ranges from a low of 96 percent to a high of 99 percent during our sample period. The number of BHCs operating branches of subsidiary banks in only one state ranges from a low of 82 percent to a high of 98 percent. Thus, most BHCs conduct their banking operations in only one state.

We find that intrastate expansion reduces the cost of both funds and deposits, similar to the interstate results of Levine, et al. (2021). This result indicates benefits to BHCs expanding geographically intrastate even without expanding interstate. Also, we decompose the measure of expansion (HHI) into two terms, one that depends on the variance of their deposit shares and one that depends on the number of counties. The first term is the contribution of HHI to the dispersion of deposit shares away from equality, the "inequality effect." The second term is what HHI would be if the deposit shares of all counties were equal, the "number of counties effect." Both coefficients are significantly positive but significantly different from one another. This finding means using HHI as an explanatory variable inappropriately constrains share inequality and the number of counties to be equal in explaining the cost of funds and deposits.

We perform three additional tests as robustness checks on our main results. First, reverse causality is possible as the funding and deposit costs may be driving the intrastate geographical restrictions on banking and branching. Our results indicate this is not the case. Second, we consider the effect of intrastate restrictions on geographic expansion and include interstate restrictions, which is the first study to consider both types of restrictions. There is the potential that BHCs in one state allowed to expand into other states may affect BHCs in those states to enlarge their deposit share. Third, there are a variety of control variables used by Levine, et al. (2021) and other related studies. Therefore, we use Lasso to determine which control variables from several related studies significantly enter the regressions. We find that some variables that are found to be significant in other studies are not found to be significant in our regressions. However, our primary results remain unchanged despite the difference in control variables.

Regarding the three channels through which geographical expansion affects the costs of funds and deposits: market power, risk reduction and agency friction. For the market power channel, we find that intrastate geographical expansion significantly increases market power. As for the risk reduction channel, overall, geographical expansion lowers the costs of funds. However, the impact is mitigated when BHCs expand into counties that have highly correlated natural conditions with the home counties and more disasters as the second channel. For the agency friction channel, the expansion of smaller BHCs (i.e., with mild agency frictions) has a significantly larger impact on reducing the cost of deposits but not the cost of funds than other BHCs.

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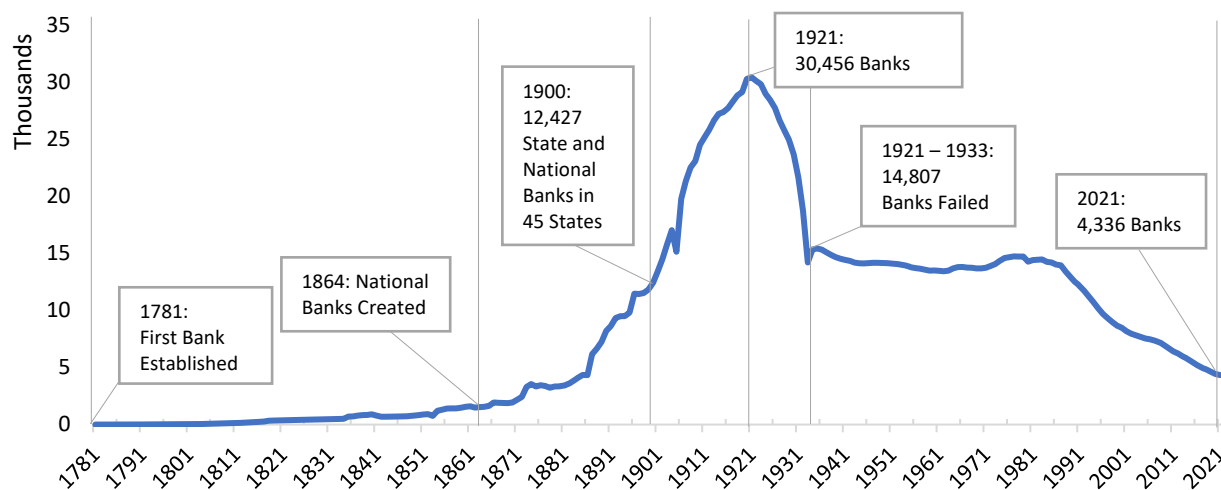
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Appendix 1. Historical Evolution of the Role of Bank Holding Companies, Banks, and Branches

As already indicated in section 2, there were relatively few banks in the early days of the United States. Indeed, as Figure 1 (also see Table A1) shows, in 1782, there was only one bank, and the number slightly increased to three in 1790. The number did not reach 100 until 1810. It took more than seventy years for the number of banks to exceed 1,000. When national banks joined state banks to form the dual banking system in the 1860s, there were roughly 1,500 banks. Subsequently, there was a rapid increase in the number of banks to 12,427 in 1900 and then to an all-time high of 30,456 in 1921. Then, from 1921 to 1933, almost half (14,807) of those banks failed, with 4,000 banks failing in 1933 alone (FDIC, 2018). After the Great Depression of the 1930s, the number of banks oscillated within a relatively narrow range, roughly 12,000, until the early 1990s. The number of banks steadily declined afterward to 4,336 in 2021, or nearly the same number as 1886.

The early growth in the number of banks reflected the geographical expansion of the increasing population into more newly established states. This situation led to the states chartering more banks, and the creation of national banks in the 1860s further accelerated the growth in the number of banks. Regarding the linkage between the number of banks and the population, the correlation from 1790 to 2021 is 0.438 and statistically significant at the 1 percent level. However, not surprisingly, given Figure 1, for the period before 1920, the correlation is extremely high and positive at 0.917 and statistically significant at the 1 percent level. Afterward, the correlation turns negative, declines to 0.840, and is statistically significant at the 1 percent level. The decline in the number of banks in the latter period reflects the growth in the number of branches resulting from the nationwide increase in mergers and acquisitions.

Figure 1. Number of Banks

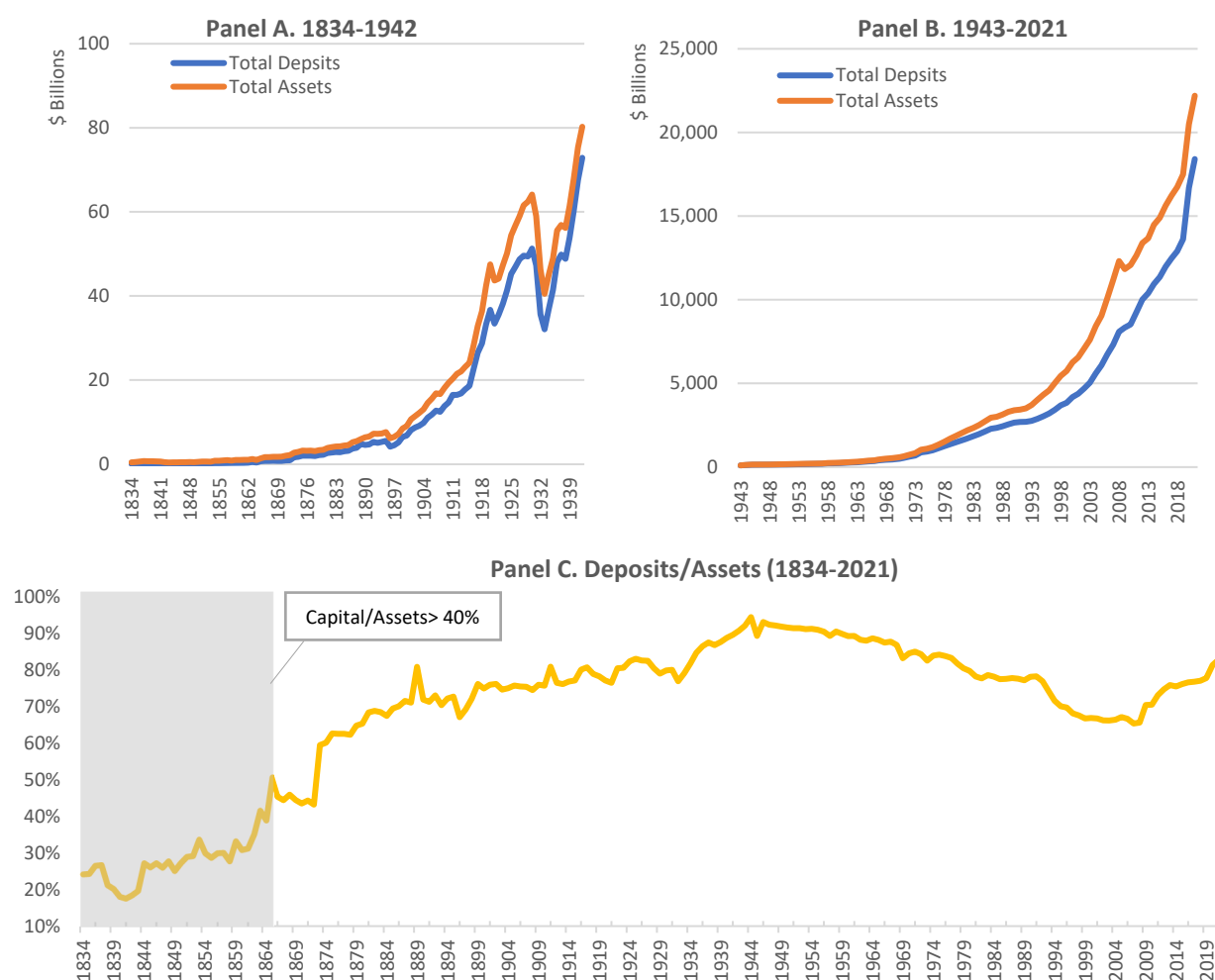


Source: Table A1²⁷.

²⁷ Throughout the paper, a table with A in front of the number indicates the table is in the Appendix.

Figure 2 shows the growth in the assets and deposits (Panels A and B, and in current dollars) of banks from 1834 to 2021, corresponding to population and economic activity growth. The most significant downturn in assets and deposits was during the Great Depression of the 1930s. Notice that when the number of banks started declining after 1921, assets and deposits, apart from the period of the Great Depression, nonetheless continued increasing to reach an all-time high of \$22 trillion in assets and \$18 trillion in deposits in 2021. As a result, the concentration of assets and deposits in ever fewer banks and banking organizations at the national level has increased in the last few decades. In 2021, the top five BHCs accounted for 53 percent of total bank assets, 42 percent of total bank deposits, and 27 percent of all bank branches. At the same time, the top five banks accounted for 46 percent of total bank assets, 42 percent of total bank deposits, and 26 percent of all bank branches.

Figure 2. Total Assets and Deposits of Banks



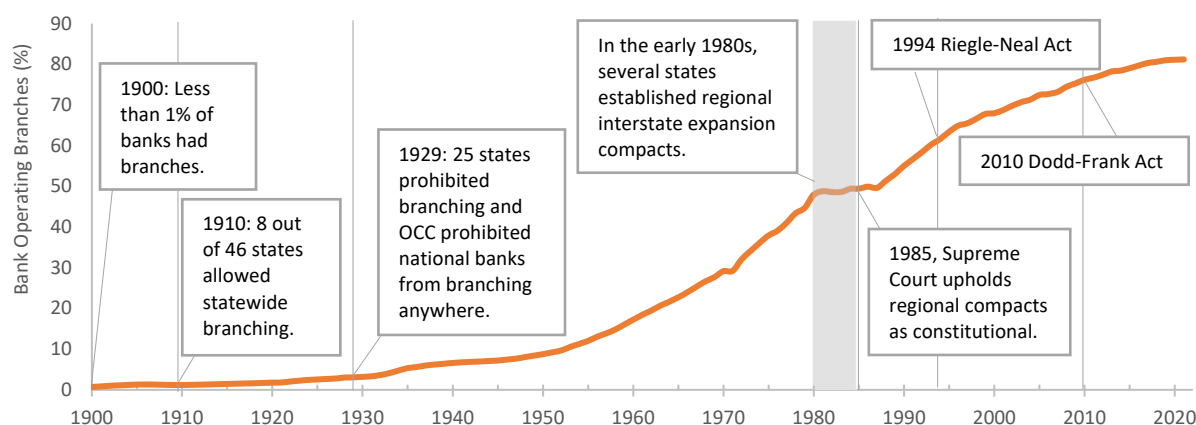
Source: Tables A2 and A3.

Panel C in Figure 2 shows the percentage of assets funded with deposits. The ratio began at 24 percent in 1834 and ended at 83 percent in 2021. The low point was in 1840, with a ratio of 18 percent, and the high point was in 1944, with a ratio of 95 percent. In the earlier period, the capital-

to-asset ratio was relatively high. For example, the ratio was 40 percent or higher during most of the earlier years before decreasing after the 1870s (Barth and Miller, 2018).

Figure 3 (also see Table A4) shows a steady increase in the percentage of banks that operated separate branches from 1900 to 2021. In 1900, 87 banks operated 119 branches, less than one percent of all banks. It was not until 1952 that the percentage reached 10 percent, with 1,359 banks operating 5,274 branches. It then tripled to 30 percent twenty years later. Subsequently, there was generally a continued increase in the percentage of banks with branches even though the total number of banks tended to decline. Starting in the early 1980s and after that, roughly 50 percent or more of all the banks had branches, reaching an all-time high of 81 percent in 2021. In that year, 3,521 banks were operating 76,280 branches. At the same time, there were 815 banks, or 19 percent of all banks, without a branch network. The increase in the percentage of banks with branches reflected the intrastate and interstate decrease in restrictions imposed on the geographical expansion of banks.

Figure 3. Shares of Banks Operating Branches



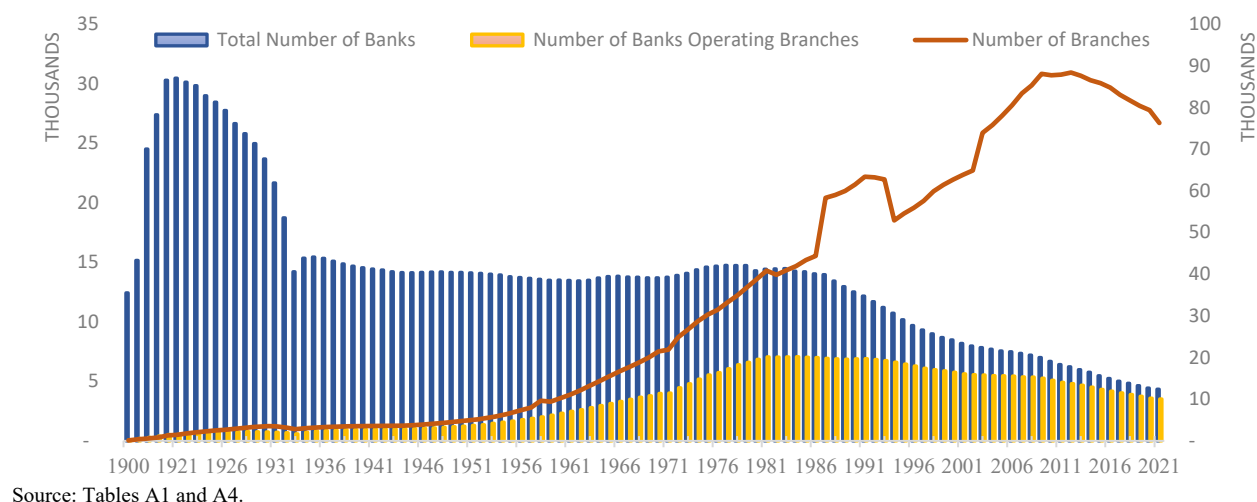
Source: Table A4.

Combining three data sets involving banks and branches may be more informative to show their relationships over time. Figure 4 (also see Tables A1 and A4) shows these relationships. In 1900, the number of branches was only 119. The number started to increase faster after the Great Depression, partly due to technological developments that made it easier to coordinate multibranch systems. There was a relatively steady increase to 44,356 in 1986 before sharply rising to 58,313 in 1987. Growth continued until 1993, when the number fell from 62,701 to 52,884 in 1994. Growth in the number of branches then resumed, reaching an all-time high of 88,373 in 2012. Since then, the number has declined to 76,280 in 2021, partly due to online banking.

Figure 4 also shows that the gap between the number of banks and the number of banks operating branches tended to widen from 1900 to 1984. After that, it declined yearly to only 815 banks not operating branches, or slightly less than 20 percent, in 2021, a decline from a huge 99 percent in 1900. Moreover, even as the number of branches decreased over the past decade, the percentage of banks operating branches increased. Moreover, of the 76,280 banks operating branches in 2021, the vast majority (92 percent) operated full-service brick-and-mortar offices. Another 8 percent

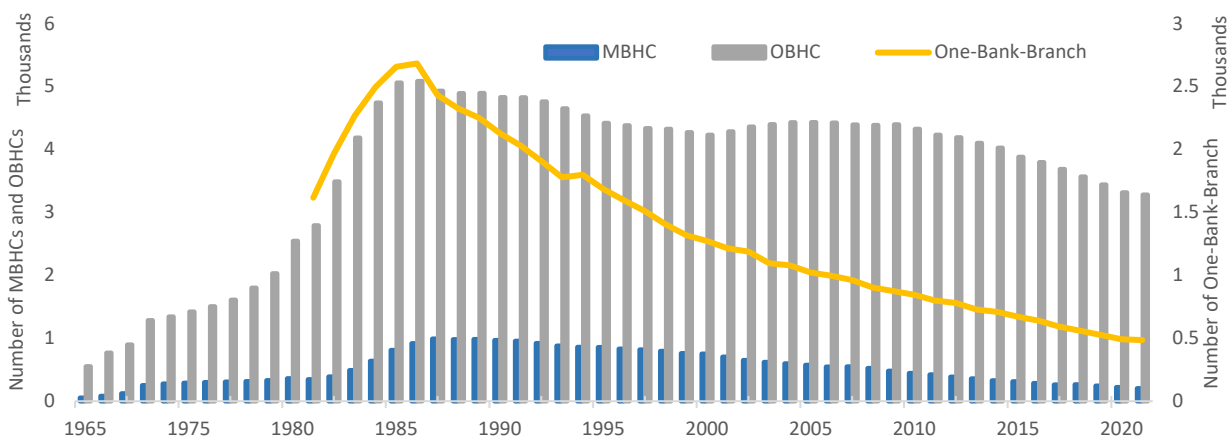
were equally divided between full-service retail offices and limited-service drive-through facilities.

Figure 4. Number of Banks, Number of Banks Operating Branches, and Number of Branches



Since our analytical focus is on BHCs, Figure 5 (also see Table A7) provides information on the relative importance of the different BHCs. As the figure shows, there are two basic types of BHCs: Multi-Bank and One-Bank. (Table A7 shows the numbers for the two types and percentages for each of the total numbers of both.) The figure also provides information on One-Branch BHCs (i.e., a One-Bank Bank Holding Company with only one branch). The number of MBHCs increased from 53 in 1965 to 991 in 1987 before declining to 202 in 2021. After the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1995, the number of MBHCs started declining rapidly as banks could and were converted into branches. As the total number of BHCs increased to 3,480 from 603 over the period, there was a shift from MBHCs to OBHCs, with the latter increasing to 3,278 from 550 and its share of the total rising from 91 to 94 percent. The OBHCs show the biggest decline in numbers from 1981 to 2021, to only 485 from 1,616, representing a decrease of 28 percentage points in the total number of OBHCs.

Figure 5. Multi-Bank Holding Companies, One-Bank Holding Companies, and One-Bank, One-Branch Holding Companies



Source: Table A7.

In 1965, there were about 600 BHCs that controlled less than 13 percent of all bank deposits. In 1980, however, the number had increased to 2,905, and they controlled 77 percent of all bank deposits. Table 1 is quite informative because it shows the relative importance of the two types of BHCs in different states in 1980 and 1990. In contrast to today, there was a significant difference among states regarding the geographical expansion restrictions placed on BHCs and banks. These restrictions contributed to the type of BHC located in a particular state. More specifically, in 1980, statewide branch banking was permissible in 23 states and the District of Columbia. Limited branch banking was allowed in 16 states. Ten states that allowed limited branching also allowed multi-bank companies, but the multi-bank form of organization in six states was prohibited or otherwise restricted. The laws of 11 states prohibited branch banking of any kind in 1980. Multi-bank companies were allowed in six unit banking states (Watkins and West, 1982).

As seen in Table 1, OBHCs were more important in the states that allowed statewide branching, while MBHCs were more important in the limited branching states, some of which permitted multi-bank organizations. Thus, in 1980, OBHCs controlled just under 37 percent of the deposits in statewide branching states, compared with only 23 percent in limited branching states, with some allowing multi-bank companies. In contrast, MBHCs controlled only about 37 percent of total deposits in statewide branching states and 37 percent in limited branching states, and 31 percent in unit banking states. The greater importance of multi-bank holding companies in limited branching states reflected that in those states allowing it, banking organizations that wanted to expand could use the multi-bank method because the branching alternative is limited or not available. On the other hand, in those states that allowed branching, expansion could occur without using the multi-bank method (Watkins and West, 1982).

By 1990, the number of states allowing statewide branching had increased to 36, while the number prohibiting branching had declined to 2. The remaining states allowed limited branching (Mengle, 1990). Table 1 shows that these changes led to MBHCs dominating OBHCs regarding shares of deposits in states with far fewer numbers.

Table 1. Percentage of Total Deposits Controlled by Holding Companies in Statewide Branching, Limited Branching, and Unit Banking States

Statewide Branching	Limited Branching	Unit Banking
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	Number of Holding Companies	Percent of States' Deposits	Number of Holding Companies	Percent of States' Deposits	Number of Holding Companies	Percent of States' Deposits
1980						
MBHC	115	36.5	142	36.8	139	30.8
OBHC	221	51.9	786	22.7	1,537	38.5
1990						
MBHC	792	74.8	124	58.7	27	70.4
OBHC	3,878	16.5	792	31.9	101	17.3

BHCs have expanded intrastate and interstate via banks and branches over the past several decades. (This information is supplied in Tables A8 and A9.) In 1987, of the 5,918 BHCs, almost all (98 percent) had subsidiary banks in just one state. Of the other 114 BHCs, the number of subsidiary banks in more than one state ranged from 60 in two states to two in eleven to fifteen states. By 2021, the number of BHCs had decreased to 3,480, and 3,430, or 99 percent, had subsidiary banks in only one state. Most (43) of the other 50 BHCs had subsidiary banks in just two states, and the other 7 BHCs had subsidiary banks in fifteen or fewer states.

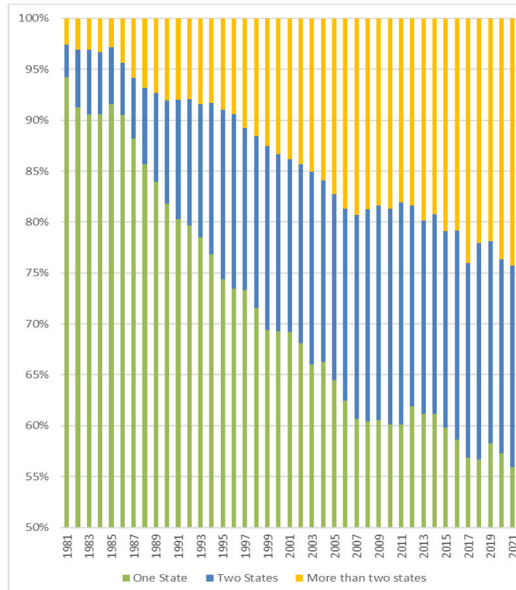
In 1987, almost all BHCs (98 percent) also had branches of their subsidiary banks in just one state. By 2021, the percentage of BHCS that had branches of their subsidiary banks in just one state had declined to 82 percent. The number of BHCs with branches in more than one state had increased to 613 from 123 over the period. The branches, moreover, had expanded to over twenty states.

Figure 6 (also see Table A9) shows the geographical expansion across states of the two types of BHCs via branches of subsidiary banks from 1981 to 2021. In 1987, the number of MBHCs with branches of subsidiary banks in only one state was 324, or 94 percent of the 334 MBHCs. By 2021, that percentage had declined to 56 percent as the number of MBHCs had also declined to 202. Their number of branches in more than one state increased from 20 in 1981 to a high of 232 in 1999 before falling to 89 in 2021. At the same time, the number of OBHCs with branches in more than one state steadily increased from 9 in 1981 to 524 in 2021. In 1981, Panel A showed 10 percent of the 344 MBHCs operated branches in one state and one operated branches in 11 to 15 states. By 2021, 56 percent of the 202 MBHCs operated branches in one state, a decrease of 32 percentage points. Also, the number of MBHCs operating branches in 11 to 15 states increased to 4 from one and increased to 5 from zero in 16 to 20 states.

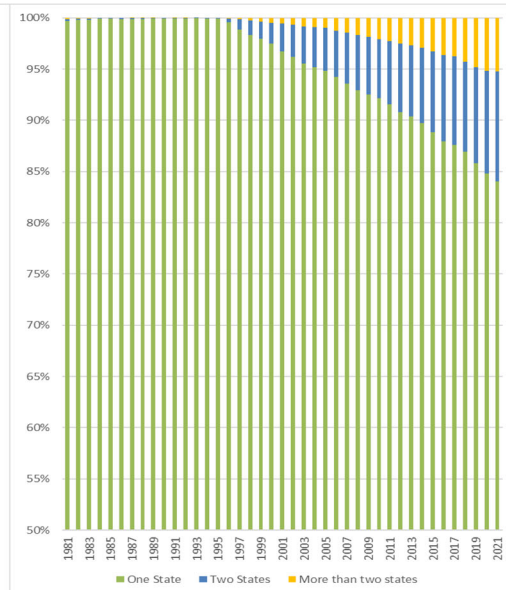
Moreover, the number of MBHCs operating branches in more than 20 states rose to 7 from zero. In Panel B, nearly all the 2,790 branches of the OBHCs were located in one state in 1981. Only six such OBHCs operated branches outside one state. However, by 2021, the number had increased to 524, and the branches were in far more states.

Figure 6. MBHCs vs. OBHCs: Geographical Expansion Across States

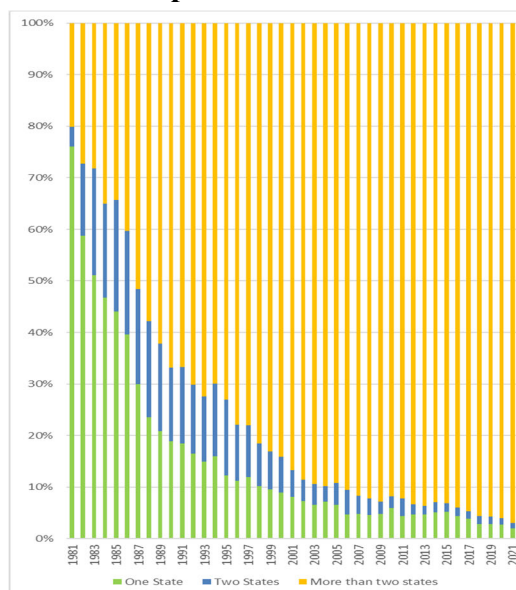
Panel A. Number of MBHCs



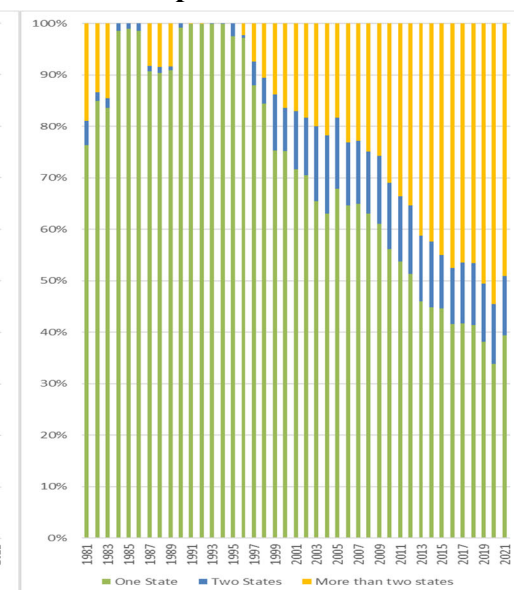
Panel B. Number of OBHCs



Panel C. Deposits of MBHCs



Panel D. Deposits of OBHCs



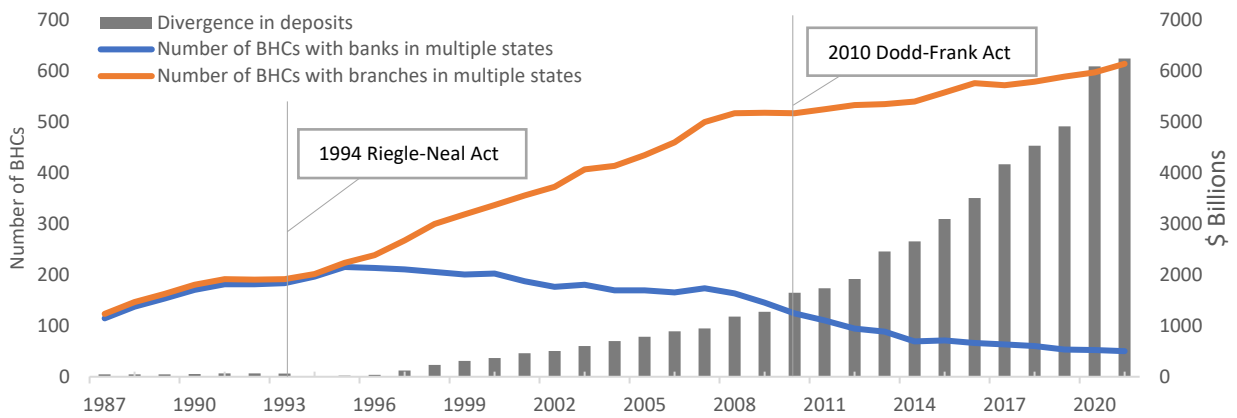
Source: Table A9.

Information on deposits rather than the number of branches is provided in Panels C and D. Panel C shows the surge in the MBHCs' share of total deposits coming from more than two states, from less than five percent in 1981 to about twenty-five percent in 2021. At the same time, the share from one state declined from nearly 95 percent to about 55 percent, or a drop of forty percentage points. Panel D shows similar information for OBHCs. The geographical expansion was far less for these BHCs and followed the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994. The share from more than one state increased by about 15 percentage points.

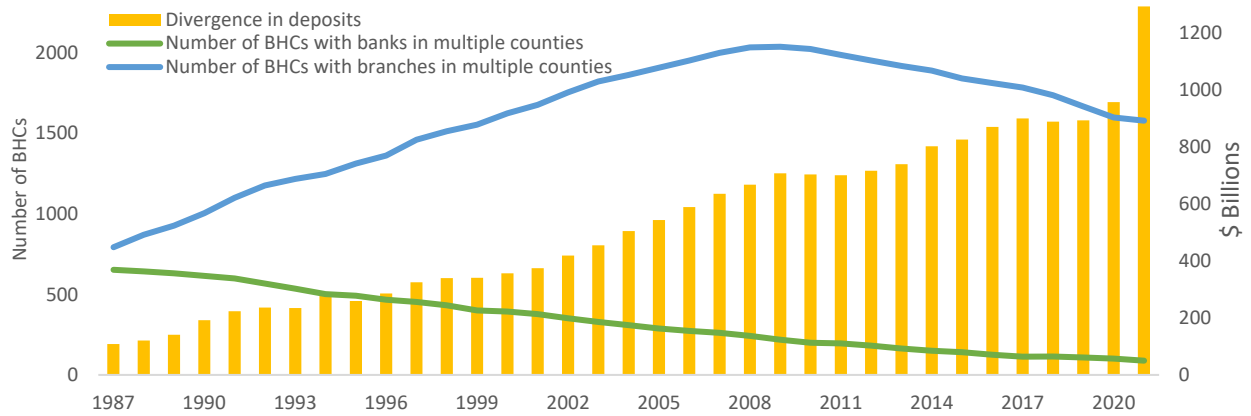
The greater concentration of the banks owned by BHCs in fewer states over the period was due to the increased geographical expansion of branches owned by the BHCs across states. Figure 7, Panel A (also see Table A10) shows that in 1987, 114 BHCs had banks in more than one state, and 123 had branches in more than one state. By 2021 the number of BHCs operating branches in more than one state had increased to 613, while the number operating banks had declined to 50. In short, as Figure 4 shows, greater geographical expansion was accomplished by branches replacing banks facilitated by less restrictive federal and state banking laws. Also, the figure shows that as branches replaced banks of BHCs expanding into other states, the deposits for the BHCs with branches correspondingly rose far more than those for BHCs with banks. In particular, the divergence, or switching point, in the numbers and deposits occurred in 1995 following the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994. Before the Act, a BHC with several subsidiary banks could approximate, to a more limited degree, a branching network in those locations where it was otherwise prohibited from operating. However, unlike a bank with branches, a BHC had to operate its subsidiary banks with each separately capitalized and its own board of directors. This situation provided an incentive to convert banks to branches when the opportunity arose due to the Act. Moreover, the BHC's subsidiary banks expanded their branch networks over time.

Figure 7, Panel B (also see Table A10) is similar to Panel A but focuses on the intrastate expansion of BHCs across counties. The figure shows that in 1987, there were 653 intrastate BHCs with banks in multiple counties and 793 BHCs with branches in multiple counties. By 2021 the number of BHCs operating branches in more than one state had increased to 1,579, while the number operating banks had declined to 88. As in the case of interstate BHCs, banks were converted to branches, and the remaining banks also expanded their networks. Yet, unlike BHC's interstate expansion, the number of intrastate BHCs operating banks in multiple counties started declining earlier, while the number of BHCs operating branches in multiple counties began increasing simultaneously. This was the result of more states relaxing restrictions on within-state expansion. In contrast, interstate restrictions were relaxed several years later. The divergence in deposits between the BHCs operating branches and banks in multiple counties in Panel B grew as the number of BHCs with branches, while the number of BHCs with banks declined over the period. Furthermore, the number of BHCs with branches in multiple counties started to fall after the 2010 Dodd-Frank Act, while the number of BHCs with branches in multiple states (Panel A) continued to increase.

Figure 7. Number of BHCs Based on Banks vs. Branches and Their Divergence in Deposits
Panel A. Number of Interstate BHCs Based on Banks vs. Branches and Their Divergence in Deposits



Panel B. Number of Intrastate BHCs Based on Banks vs. Branches and Their Divergence in Deposits



Source: Table A10.

Table A1. Number of Banks

Year	Total Number of Banks	Year	Total Number of Banks	Year	Total Number of Banks	Year	Total Number of Banks	Year	Total Number of Banks	Year	Total Number of Banks	Year	Total Number of Banks
2021	4,336	1986	14,027	1951	14,107	1916	27,739	1881	3,427	1846	707	1811	117
2020	4,430	1985	14,206	1950	14,146	1915	27,390	1880	3,355	1845	707	1810	102
2019	4,630	1984	14,261	1949	14,151	1914	27,236	1879	3,335	1844	696	1809	92
2018	4,833	1983	14,469	1948	14,189	1913	26,664	1878	3,229	1843	691	1808	86
2017	5,011	1982	14,451	1947	14,182	1912	25,844	1877	3,384	1842	692	1807	83
2016	5,238	1981	14,414	1946	14,152	1911	25,183	1876	3,448	1841	784	1806	78
2015	5,472	1980	14,279	1945	14,126	1910	24,514	1875	3,336	1840	901	1805	71
2014	5,759	1979	14,730	1944	14,138	1909	23,098	1874	3,552	1839	840	1804	64
2013	5,980	1978	14,729	1943	14,197	1908	22,531	1873	3,298	1838	829	1803	53
2012	6,222	1977	14,746	1942	14,353	1907	21,361	1872	2,419	1837	788	1802	35
2011	6,413	1976	14,668	1941	14,434	1906	19,786	1871	2,175	1836	713	1801	32
2010	6,676	1975	14,597	1940	14,534	1905	15,152	1870	1,937	1835	704	1800	28
2009	6,995	1974	14,360	1939	14,667	1904	17,037	1869	1,878	1834	506	1799	25
2008	7,203	1973	14,069	1938	14,867	1903	15,814	1868	1,887	1833	496	1798	22
2007	7,350	1972	13,896	1937	15,094	1902	14,488	1867	1,908	1832	485	1797	22
2006	7,479	1971	13,749	1936	15,329	1901	13,424	1866	1,931	1831	475	1796	22
2005	7,549	1970	13,690	1935	15,438	1900	12,427	1865	1,643	1830	464	1795	20
2004	7,692	1969	13,694	1934	15,348	1899	11,835	1864	1,556	1829	454	1794	15
2003	7,831	1968	13,743	1933	14,207	1898	11,530	1863	1,532	1828	443	1793	15
2002	7,967	1967	13,762	1932	18,734	1897	11,438	1862	1,492	1827	433	1792	12
2001	8,178	1966	13,821	1931	21,654	1896	11,474	1861	1,601	1826	422	1791	5
2000	8,478	1965	13,805	1930	23,679	1895	9,818	1860	1,562	1825	412	1790	3
1999	8,674	1964	13,682	1929	24,970	1894	9,508	1859	1,476	1824	401	1789	2
1998	8,982	1963	13,494	1928	25,798	1893	9,492	1858	1,422	1823	391	1788	2
1997	9,307	1962	13,434	1927	26,650	1892	9,336	1857	1,416	1822	380	1787	2
1996	9,689	1961	13,474	1926	27,742	1891	8,641	1856	1,398	1821	370	1786	1
1995	10,166	1960	13,503	1925	28,442	1890	8,201	1855	1,307	1820	359	1785	2
1994	10,717	1959	13,492	1924	28,988	1889	7,244	1854	1,208	1819	349	1784	2
1993	11,207	1958	13,574	1923	29,829	1888	6,647	1853	750	1818	338	1783	1
1992	11,691	1957	13,658	1922	30,120	1887	6,170	1852	913	1817	262	1782	1
1991	12,164	1956	13,719	1921	30,456	1886	4,328	1851	879	1816	232		
1990	12,514	1955	13,780	1920	30,291	1885	4,350	1850	824	1815	212		
1989	12,952	1954	13,936	1919	29,147	1884	4,113	1849	782	1814	202		
1988	13,422	1953	14,005	1918	28,856	1883	3,835	1848	751	1813	147		
1987	13,955	1952	14,069	1917	28,298	1882	3,572	1847	715	1812	143		

Sources:

1. FDIC Summary of Deposits;
2. Historical Statistics of United States (2006), Bureau of the Census, U.S. Department of Commerce, U.S. government printing office, Washington, D.C

Table A2. Total Deposits

Year	Total Deposits (\$M)	Year	Total Deposits (\$M)	Year	Total Deposits (\$M)	Year	Total Deposits (\$M)	Year	Total Deposits (\$M)	Year	Total Deposits (\$M)
2021	18,410,367	1986	2,283,527	1951	151,475	1916	22,613	1881	2,649	1846	125
2020	16,684,223	1985	2,118,088	1950	143,845	1915	18,612	1880	2,222	1845	114
2019	13,614,890	1984	1,962,935	1949	137,638	1914	17,806	1879	2,149	1844	117
2018	12,898,467	1983	1,842,503	1948	138,162	1913	16,808	1878	1,921	1843	78
2017	12,467,587	1982	1,705,689	1947	135,933	1912	16,455	1877	2,006	1842	88
2016	11,982,312	1981	1,588,782	1946	143,042	1911	16,452	1876	1,993	1841	108
2015	11,349,504	1980	1,481,162	1945	130,727	1910	14,644	1875	2,009	1840	120
2014	10,938,733	1979	1,362,805	1944	118,235	1909	13,789	1874	1,740	1839	143
2013	10,385,834	1978	1,233,403	1943	96,175	1908	12,425	1873	1,625	1838	146
2012	10,012,098	1977	1,116,618	1942	72,894	1907	12,727	1872	927	1837	190
2011	9,258,874	1976	991,913	1941	67,588	1906	11,791	1871	888	1836	166
2010	8,517,723	1975	915,856	1940	60,246	1905	11,028	1870	775	1835	122
2009	8,336,603	1974	871,225	1939	53,894	1904	9,789	1869	772	1834	102
2008	8,085,710	1973	681,619	1938	48,814	1903	9,107	1868	798		
2007	7,313,861	1972	616,908	1937	49,845	1902	8,713	1867	744		
2006	6,735,639	1971	539,184	1936	48,118	1901	8,114	1866	759		
2005	6,077,508	1970	482,506	1935	41,462	1900	6,792	1865	689		
2004	5,596,572	1969	436,990	1934	36,810	1899	6,472	1864	380		
2003	5,034,669	1968	434,652	1933	32,078	1898	5,175	1863	504		
2002	4,689,788	1967	395,796	1932	35,658	1897	4,486	1862	357		
2001	4,377,558	1966	352,840	1931	47,277	1896	4,142	1861	319		
2000	4,179,567	1965	331,513	1930	51,267	1895	5,539	1860	310		
1999	3,831,058	1964	306,230	1929	49,385	1894	5,268	1859	328		
1998	3,681,391	1963	274,647	1928	49,582	1893	5,065	1858	237		
1997	3,421,664	1962	261,444	1927	48,704	1892	5,298	1857	288		
1996	3,197,139	1961	247,905	1926	46,952	1891	4,683	1856	265		
1995	3,027,576	1960	228,993	1925	45,230	1890	4,576	1855	236		
1994	2,874,439	1959	219,012	1924	41,343	1889	4,811	1854	239		
1993	2,754,330	1958	215,169	1923	38,175	1888	3,891	1853	195		
1992	2,698,682	1957	186,292	1922	35,532	1887	3,719	1852	182		
1991	2,687,664	1956	186,320	1921	33,432	1886	3,186	1851	174		
1990	2,650,150	1955	181,512	1920	36,682	1885	3,078	1850	146		
1989	2,548,505	1954	174,065	1919	33,254	1884	2,849	1849	121		
1988	2,431,735	1953	165,548	1918	28,708	1883	2,884	1848	143		
1987	2,335,456	1952	162,365	1917	26,501	1882	2,777	1847	120		

Sources:

1. FDIC Summary of Deposits;
2. Historical Statistics of United States (2006), Bureau of the Census, U.S. Department of Commerce, U.S. government printing office, Washington, D.C

Table A3. Total Assets

Year	Total Assets (\$M)	Year	Total Assets (\$M)	Year	Total Assets (\$M)	Year	Total Assets (\$M)	Year	Total Assets (\$M)	Year	Total Assets (\$M)
2021	22,195,308	1986	2,940,699	1951	165,503	1916	28,217	1881	3,869	1846	456
2020	20,490,824	1985	2,730,672	1950	156,914	1915	24,106	1880	3,399	1845	434
2019	17,491,818	1984	2,508,871	1949	149,705	1914	23,155	1879	3,313	1844	427
2018	16,728,102	1983	2,342,101	1948	149,799	1913	22,056	1878	3,081	1843	393
2017	16,217,881	1982	2,193,339	1947	146,974	1912	21,495	1877	3,204	1842	472
2016	15,627,781	1981	2,028,982	1946	153,507	1911	20,320	1876	3,183	1841	608
2015	14,893,215	1980	1,855,687	1945	146,245	1910	19,324	1875	3,205	1840	658
2014	14,474,658	1979	1,691,789	1944	125,031	1909	18,145	1874	2,891	1839	702
2013	13,673,057	1978	1,507,936	1943	104,322	1908	16,664	1873	2,731	1838	682
2012	13,387,499	1977	1,339,376	1942	80,276	1907	16,862	1872	2,145	1837	707
2011	12,650,468	1976	1,182,412	1941	75,356	1906	15,601	1871	2,003	1836	622
2010	12,069,443	1975	1,086,674	1940	67,804	1905	14,542	1870	1,781	1835	498
2009	11,826,782	1974	1,037,197	1939	61,422	1904	13,035	1869	1,736	1834	419
2008	12,313,141	1973	824,960	1938	56,185	1903	12,190	1868	1,736		
2007	11,181,901	1972	730,902	1937	56,907	1902	11,427	1867	1,674		
2006	10,097,742	1971	633,573	1936	55,572	1901	10,672	1866	1,673		
2005	9,046,946	1970	570,158	1935	48,905	1900	9,059	1865	1,357		
2004	8,420,099	1969	524,645	1934	44,978	1899	8,489	1864	973		
2003	7,601,000	1968	500,160	1933	40,511	1898	7,170	1863	1,209		
2002	7,076,844	1967	450,647	1932	46,304	1897	6,475	1862	1,012		
2001	6,552,294	1966	402,899	1931	59,017	1896	6,167	1861	1,016		
2000	6,245,560	1965	375,394	1930	64,125	1895	7,610	1860	1,000		
1999	5,735,135	1964	345,130	1929	62,442	1894	7,291	1859	983		
1998	5,442,604	1963	311,790	1928	61,563	1893	7,192	1858	849		
1997	5,018,532	1962	295,983	1927	58,973	1892	7,245	1857	953		
1996	4,582,165	1961	277,374	1926	56,781	1891	6,562	1856	880		
1995	4,315,175	1960	256,322	1925	54,401	1890	6,358	1855	817		
1994	4,012,107	1959	243,422	1924	50,136	1889	5,945	1854	795		
1993	3,707,088	1958	237,474	1923	47,332	1888	5,471	1853	577		
1992	3,506,171	1957	208,375	1922	44,106	1887	5,193	1852	620		
1991	3,430,682	1956	205,707	1921	43,669	1886	4,542	1851	597		
1990	3,389,490	1955	199,244	1920	47,509	1885	4,427	1850	532		
1989	3,299,362	1954	190,581	1919	42,462	1884	4,221	1849	479		
1988	3,130,796	1953	181,427	1918	36,352	1883	4,208	1848	512		
1987	2,999,949	1952	177,417	1917	32,802	1882	4,031	1847	458		

Sources:

1. FDIC Summary of Deposits;
2. Historical Statistics of United States (2006), Bureau of the Census, U.S. Department of Commerce, U.S. government printing office, Washington, D.C

Table A4. Number of Banks Operating Branches and Number of Branches

Year	Number of Banks Operating Branches	Number of Branches	Banks Operating Branches (%)	Year	Number of Banks Operating Branches	Number of Branches	Banks Operating Branches (%)	Year	Number of Banks Operating Branches	Number of Branches	Banks Operating Branches (%)
2021	3,521	76,280	81	1985	7,024	43,347	49	1949	1,191	4,485	8
2020	3,593	79,351	81	1984	7,068	41,907	50	1948	1,140	4,279	8
2019	3,750	80,389	81	1983	7,054	40,913	49	1947	1,089	4,090	8
2018	3,896	81,678	81	1982	7,037	39,835	49	1946	1,053	3,902	7
2017	4,025	83,023	80	1981	7,052	40,838	49	1945	1,016	3,723	7
2016	4,174	84,748	80	1980	6,858	38,779	48	1944	999	3,632	7
2015	4,325	85,845	79	1979	6,590	36,853	45	1943	989	3,580	7
2014	4,518	86,530	78	1978	6,393	34,857	43	1942	985	3,575	7
2013	4,679	87,597	78	1977	6,061	33,171	41	1941	973	3,564	7
2012	4,816	88,373	77	1976	5,739	31,404	39	1940	959	3,531	7
2011	4,920	87,875	77	1975	5,540	30,262	38	1939	939	3,497	6
2010	5,087	87,725	76	1974	5,186	28,705	36	1938	921	3,445	6
2009	5,268	88,061	75	1973	4,799	26,718	34	1937	903	3,412	6
2008	5,365	85,285	74	1972	4,459	24,872	32	1936	859	3,271	6
2007	5,380	83,360	73	1971	4,016	21,880	29	1935	822	3,156	5
2006	5,436	80,473	73	1970	3,994	21,424	29	1934	729	3,007	5
2005	5,470	78,027	72	1969	3,794	19,985	28	1933	584	2,786	4
2004	5,487	75,772	71	1968	3,665	18,777	27	1932	681	3,195	4
2003	5,537	73,888	71	1967	3,487	17,690	25	1931	723	3,467	3
2002	5,564	64,882	70	1966	3,313	16,648	24	1930	751	3,522	3
2001	5,624	63,821	69	1965	3,140	15,486	23	1929	764	3,353	3
2000	5,765	62,673	68	1964	2,966	14,321	22	1928	775	3,138	3
1999	5,879	61,402	68	1963	2,791	13,220	21	1927	740	2,914	3
1998	5,983	59,889	67	1962	2,619	12,068	19	1926	744	2,703	3
1997	6,095	57,573	65	1961	2,484	11,077	18	1925	720	2,525	3
1996	6,289	55,916	65	1960	2,329	10,216	17	1924	706	2,297	2
1995	6,448	54,524	63	1959	2,164	9,388	16	1923	671	2,054	2
1994	6,606	52,884	62	1958	2,010	9,613	15	1922	610	1,801	2
1993	6,751	62,701	60	1957	1,893	7,968	14	1921	547	1,455	2
1992	6,833	63,228	58	1956	1,790	7,362	13	1920	530	1,281	2
1991	6,900	63,353	57	1955	1,659	6,710	12	1915	397	785	1
1990	6,888	61,475	55	1954	1,571	6,108	11	1910	292	548	1
1989	6,871	59,930	53	1953	1,474	5,627	11	1905	196	350	1
1988	6,898	59,004	51	1952	1,359	5,274	10	1900	87	119	1
1987	6,927	58,313	50	1951	1,299	4,994	9				
1986	7,004	44,356	50	1950	1,241	4,721	9				

Sources:

1. FDIC historical dataset

https://banks.data.fdic.gov/explore/historical/?displayFields=STNAME%2CTOTAL%2CBRANCHES%2CNew_Ch ar&selectedEndDate=2021&selectedReport=CBS&selectedStartDate=1934&selectedStates=0&sortField=YEAR&sortOrder=desc; 2. FDIC Summary of Deposits; 3. FDIC quarterly banking profile <https://www.fdic.gov/analysis/quarterly-banking-profile/statistics-at-a-glance/>

4. Historical Statistics of United States (2006), Bureau of the Census, U.S. Department of Commerce, U.S. government printing office, Washington, D.C

5. Van Fenstermaker, J. (1965). The Statistics of American Commercial Banking, 1782–1818. The Journal of Economic History, 25(3), 400-413. doi:10.1017/S0022050700057375

Table A5. Bank Holding Companies and Individual Banks

Year	BHCs			Individual Banks			Totals		
	Number of Subsidiary Banks	Number of Subsidiary Bank Branches	Subsidiary Bank Assets (\$B)	Number of Banks	Number of Branches	Assets (\$B)	Number of Banks	Number of Branches	Assets (\$B)
2021	3,765 (87)	73,437 (96)	20,680 (97)	571 (13)	2,843 (4)	679 (3)	4,336	76,280	21,359
2020	3,827 (86)	76,302 (96)	19,250 (97)	603 (14)	3,049 (4)	592 (3)	4,430	79,351	19,842
2019	3,997 (86)	77,186 (96)	16,570 (97)	633 (14)	3,203 (4)	527 (3)	4,630	80,389	17,097
2018	4,163 (86)	78,823 (97)	15,939 (97)	670 (14)	2,855 (3)	428 (3)	4,833	81,678	16,367
2017	4,308 (86)	80,321 (97)	15,502 (98)	703 (14)	2,702 (3)	392 (2)	5011	83,023	15,893
2016	4,469 (85)	82,142 (97)	15,083 (98)	769 (15)	2,606 (3)	343 (2)	5,238	84,748	15,426
2015	4,603 (84)	83,017 (97)	14,329 (98)	869 (16)	2,828 (3)	350 (2)	5,472	85,845	14,679
2014	4,801 (83)	83,457 (96)	13,769 (98)	958 (17)	3,073 (4)	337 (2)	5,759	86,530	14,106
2013	4,973 (83)	84,469 (96)	13,017 (98)	1,007 (17)	3,128 (4)	333 (2)	5,980	87,597	13,350
2012	5,153 (83)	85,171 (96)	12,573 (98)	1,069 (17)	3,202 (4)	317 (2)	6,222	88,373	12,890
2011	5,297 (83)	84,632 (96)	12,069 (98)	1,116 (17)	3,243 (4)	298 (2)	6,413	87,875	12,367
2010	5,519 (83)	84,545 (96)	11,701 (98)	1,157 (17)	3,180 (4)	268 (2)	6,676	87,725	11,969
2009	5,775 (83)	84,793 (96)	11,519 (98)	1,220 (17)	3,268 (4)	256 (2)	6,995	88,061	11,775
2008	5,927 (82)	81,975 (96)	10,992 (96)	1,276 (18)	3,310 (4)	434 (4)	7,203	85,285	11,426
2007	6,037 (82)	79,905 (96)	10,003 (96)	1,313 (18)	3,455 (4)	408 (4)	7,350	83,360	10,411
2006	6,096 (82)	76,888 (96)	9,250 (96)	1,383 (18)	3,585 (4)	352 (4)	7,479	80,473	9,602
2005	6,165 (82)	74,456 (95)	8,393 (96)	1,384 (18)	3,571 (5)	332 (4)	7,549	78,027	8,725
2004	6,279 (82)	72,170 (95)	7,705 (96)	1,413 (18)	3,602 (5)	345 (4)	7,692	75,772	8,050
2003	6,336 (81)	70,017 (95)	7,135 (95)	1,495 (19)	3,871 (5)	350 (5)	7,831	73,888	7,485
2002	6,385 (80)	62,353 (96)	6,385 (95)	1,582 (20)	2,529 (4)	346 (5)	7,967	64,882	6,732
2001	6,483 (79)	61,198 (96)	6,016 (95)	1,695 (21)	2,623 (4)	344 (5)	8,178	63,821	6,360
2000	6,678 (79)	59,953 (96)	5,756 (96)	1,800 (21)	2,720 (4)	228 (4)	8,478	62,673	5,983
1999	6,832 (79)	58,547 (95)	5,265 (96)	1,842 (21)	2,855 (5)	203 (4)	8,674	61,402	5,468
1998	7,007 (78)	56,756 (95)	4,973 (96)	1,975 (22)	3,133 (5)	210 (4)	8,982	59,889	5,183
1997	7,117 (76)	54,175 (94)	4,528 (95)	2,190 (24)	3,398 (6)	243 (5)	9,307	57,573	4,771
1996	7,355 (76)	52,407 (94)	4,164 (95)	2,334 (24)	3,509 (6)	233 (5)	9,689	55,916	4,397
1995	7,616 (75)	50,821 (93)	3,944 (95)	2,550 (25)	3,703 (7)	227 (5)	10,166	54,524	4,171
1994	7,859 (73)	49,151 (93)	3,670 (94)	2,858 (27)	3,734 (7)	222 (6)	10,717	52,884	3,892
1993	8,079 (72)	55,814 (89)	3,329 (93)	3,128 (28)	6,887 (11)	241 (7)	11,207	62,701	3,570
1992	8,374 (72)	55,962 (89)	3,194 (93)	3,317 (28)	7,266 (11)	245 (7)	11,691	63,228	3,439
1991	8,651 (71)	55,810 (88)	3,131 (93)	3,513 (29)	7,543 (12)	246 (7)	12,164	63,353	3,377
1990	8,800 (70)	53,575 (87)	3,117 (93)	3,714 (30)	7,900 (13)	244 (7)	12,514	61,475	3,361
1989	9,032 (70)	51,776 (86)	2,954 (92)	3,920 (30)	8,154 (14)	253 (8)	12,952	59,930	3,207
1988	9,201 (69)	50,307 (85)	2,813 (92)	4,221 (31)	8,697 (15)	243 (8)	13,422	59,004	3,056
1987	9,392 (67)	48,953 (84)	2,683 (92)	4,563 (33)	9,361 (16)	230 (8)	13,955	58,313	2,913

Sources:

1. FDIC Summary of Deposits;
2. Federal Reserve Bank of Chicago

Table A6. Top 5 Bank Holding Companies (measured by total assets)

Year	Number 1 BHC	Number 2 BHC	Number 3 BHC	Number 4 BHC	Number 5 BHC	Total Assets of BHCs (\$B)
2021	3,609 (16)	2,873 (13)	2,313 (10)	1,933 (8)	1,249 (5)	22,781
2020	3,393 (15)	3,281 (14)	3,221 (14)	2,883 (13)	2,786 (12)	21,319
2019	2,772 (12)	2,760 (12)	2,735 (12)	2,683 (12)	2,448 (11)	19,161
2018	2,636 (12)	2,611 (11)	2,598 (11)	2,584 (11)	2,344 (10)	19,032
2017	2,565 (11)	2,559 (11)	2,556 (11)	2,531 (11)	2304 (10)	18,651
2016	2,529 (11)	2,471 (11)	2,436 (11)	2,390 (10)	2211 (10)	18,353
2015	2,549 (11)	2,488 (11)	2,416 (11)	2,404 (11)	2183 (10)	17,252
2014	2,504 (11)	2,447 (11)	2,413 (11)	2,397 (11)	2175 (10)	16,606
2013	2,402 (11)	2,391 (10)	2,385 (10)	2,312 (10)	2209 (10)	16,133
2012	2,300 (10)	2,259 (10)	2,252 (10)	2,242 (10)	2205 (10)	16,499
2011	2,332 (10)	2,327 (10)	2,289 (10)	2,259 (10)	2225 (10)	16,693
2010	2,515 (11)	2,492 (11)	2,375 (10)	2,360 (10)	2084 (9)	16,737
2009	2,519 (11)	2,433 (11)	2,430 (11)	2,395 (11)	2071 (9)	16,343
2008	2,301 (10)	2,193 (10)	2,172 (10)	2,123 (9)	2024 (9)	14,247
2007	2,301 (10)	2,283 (10)	2,178 (10)	1,941 (9)	1734 (8)	13,538
2006	1,809 (8)	1,683 (7)	1,642 (7)	1,577 (7)	1500 (7)	11,889
2005	1,530 (7)	1,502 (7)	1,499 (7)	1,450 (6)	1305 (6)	17,479
2004	1,474 (6)	1,431 (6)	1,392 (6)	1,317 (6)	1155 (5)	15,118
2003	1,241 (5)	1,193 (5)	1,176 (5)	1,174 (5)	790 (3)	12,097
2002	1,110 (5)	1,101 (5)	1,098 (5)	1,085 (5)	754 (3)	10,719
2001	1,066 (5)	1,027 (5)	965 (4)	947 (4)	739 (3)	10,241
2000	929 (4)	817 (4)	779 (3)	734 (3)	705 (3)	9,026
1999	706 (3)	706 (3)	700 (3)	697 (3)	631 (3)	8,012
1998	701 (3)	607 (3)	578 (3)	378 (2)	377 (2)	7,236
1997	376 (2)	360 (2)	349 (2)	340 (1)	301 (1)	5,756
1996	332 (1)	324 (1)	318 (1)	315 (1)	275 (1)	5,316
1995	275 (1)	270 (1)	267 (1)	267 (1)	232 (1)	4,965
1994	269 (1)	265 (1)	258 (1)	253 (1)	215 (1)	4,580
1993	233 (1)	229 (1)	227 (1)	225 (1)	187 (1)	4,154
1992	231 (1)	228 (1)	223 (1)	221 (1)	189 (1)	3,978
1991	225 (1)	222 (1)	221 (1)	220 (1)	141 (1)	3,749
1990	234 (1)	233 (1)	232 (1)	228 (1)	113 (0)	3,761
1989	221 (1)	216 (1)	212 (1)	212 (1)	107 (0)	2,989
1988	213 (1)	206 (1)	204 (1)	204 (1)	97 (0)	2,689
1987	205 (1)	198 (1)	197 (1)	194 (1)	102 (0)	2,557
1986	189 (1)	185 (1)	115 (1)	107 (0)	93 (0)	2,390

Sources: Federal Reserve Bank of Chicago.

Table A7. Number of Bank Holding Company Types

Year	Mult-Bank	Mult-Bank Mult-states (Bank)	Mult-Bank Mult-states (Branch)	One-Bank	One-Bank Mult-states	One-Bank- Branch	Total
2021	202 (6)	50 (1)	89 (3)	3,278 (94)	524 (15)	485 (14)	3,480
2020	220 (6)	52 (1)	94 (3)	3,312 (94)	503 (14)	491 (14)	3,531
2019	242 (7)	52 (1)	101 (3)	3,438 (94)	487 (13)	525 (14)	3,677
2018	263 (7)	60 (2)	114 (3)	3,564 (93)	465 (12)	559 (15)	3,822
2017	262 (7)	63 (2)	113 (3)	3,683 (93)	457 (12)	592 (15)	3,947
2016	283 (7)	66 (2)	117 (3)	3,792 (93)	457 (11)	639 (16)	4,077
2015	311 (7)	71 (2)	125 (3)	3,876 (93)	432 (10)	670 (16)	4,187
2014	327 (8)	69 (2)	127 (3)	4,022 (92)	412 (9)	709 (16)	4,349
2013	358 (8)	88 (2)	139 (3)	4,099 (92)	395 (9)	727 (16)	4,457
2012	386 (8)	94 (2)	147 (3)	4,187 (92)	385 (8)	780 (17)	4,573
2011	421 (9)	110 (2)	168 (4)	4,227 (91)	356 (8)	799 (17)	4,648
2010	444 (9)	124 (3)	177 (4)	4,322 (91)	339 (7)	844 (18)	4,766
2009	479 (10)	145 (3)	189 (4)	4,393 (90)	328 (7)	874 (18)	4,872
2008	523 (11)	163 (3)	207 (4)	4,383 (89)	309 (6)	902 (18)	4,906
2007	549 (11)	173 (4)	216 (4)	4,390 (89)	283 (6)	962 (19)	4,939
2006	546 (11)	165 (3)	205 (4)	4,420 (89)	254 (5)	996 (20)	4,966
2005	574 (11)	169 (3)	204 (4)	4,428 (89)	230 (5)	1,021 (20)	5,002
2004	596 (12)	169 (3)	201 (4)	4,427 (88)	212 (4)	1,078 (21)	5,023
2003	618 (12)	180 (4)	210 (4)	4,395 (88)	196 (4)	1,095 (22)	5,013
2002	649 (13)	176 (4)	207 (4)	4,358 (87)	165 (3)	1,187 (24)	5,007
2001	702 (14)	187 (4)	216 (4)	4,282 (86)	139 (3)	1,213 (24)	4,984
2000	751 (15)	202 (4)	231 (5)	4,227 (85)	105 (2)	1,271 (26)	4,978
1999	758 (15)	200 (4)	232 (5)	4,269 (85)	86 (2)	1,317 (26)	5,027
1998	794 (16)	205 (4)	226 (4)	4,323 (84)	73 (1)	1,404 (27)	5,117
1997	817 (16)	210 (4)	218 (4)	4,333 (84)	49 (1)	1,509 (29)	5,150
1996	829 (16)	213 (4)	220 (4)	4,378 (84)	18 (0)	1,594 (31)	5,207
1995	855 (16)	215 (4)	219 (4)	4,415 (84)	4 (0)	1,684 (32)	5,270
1994	858 (16)	196 (4)	199 (4)	4,533 (84)	2 (0)	1,798 (33)	5,391
1993	878 (16)	183 (3)	189 (3)	4,647 (84)	2 (0)	1,777 (32)	5,525
1992	919 (16)	181 (3)	187 (3)	4,756 (84)	3 (0)	1,907 (34)	5,675
1991	954 (17)	181 (3)	188 (3)	4,822 (83)	3 (0)	2,030 (35)	5,776
1990	967 (17)	170 (3)	176 (3)	4,824 (83)	4 (0)	2,128 (37)	5,791
1989	983 (17)	153 (3)	158 (3)	4,891 (83)	4 (0)	2,250 (38)	5,874
1988	979 (17)	137 (2)	140 (2)	4,888 (83)	6 (0)	2,324 (40)	5,867
1987	991 (17)	114 (2)	117 (2)	4,927 (83)	6 (0)	2,429 (41)	5,918
1986	916 (15)	n.a	87 (1)	5,082 (85)	6 (0)	2,683 (45)	5,998
1985	809 (14)	n.a	68 (1)	5,057 (86)	4 (0)	2,655 (45)	5,866
1984	637 (12)	n.a	60 (1)	4,738 (88)	4 (0)	2,492 (46)	5,375
1983	489 (10)	n.a	46 (1)	4,181 (90)	7 (0)	2,266 (49)	4,670
1982	389 (10)	n.a	34 (1)	3,486 (90)	7 (0)	1,965 (51)	3,875
1981	344 (11)	n.a	20 (1)	2,790 (89)	9 (0)	1,616 (52)	3,134
1980	361 (12)	n.a	n.a	2,544 (88)	n.a	n.a	2,905
1979	329 (14)	n.a	n.a	2,028 (86)	n.a	n.a	2,357
1978	314 (15)	n.a	n.a	1,799 (85)	n.a	n.a	2,113
1977	306 (16)	n.a	n.a	1,607 (84)	n.a	n.a	1,913
1976	298 (17)	n.a	n.a	1,504 (83)	n.a	n.a	1,802
1975	289 (17)	n.a	n.a	1,419 (83)	n.a	n.a	1,708
1974	276 (17)	n.a	n.a	1,340 (83)	n.a	n.a	1,616
1973	251 (16)	n.a	n.a	1,282 (84)	n.a	n.a	1,533
1970	121 (12)	n.a	n.a	895 (88)	n.a	n.a	1,016
1968	80 (9)	n.a	n.a	767 (91)	n.a	n.a	847
1965	53 (9)	n.a	n.a	550 (91)	n.a	n.a	603

Table A8. Bank Holding Companies: Number of States with Subsidiary Banks
Panel A. Number of bank holding companies that operate subsidiary banks in one or more states

Year	Number of States							Total
	1	2	3	4	5	6-10	11-15	
2021	3,430 (99)	43 (1)	3 (0)	2 (0)	1 (0)	-	1 (0)	3,480
2020	3,479 (99)	46 (1)	3 (0)	2 (0)	-	-	1 (0)	3,531
2019	3,624 (99)	45 (1)	4 (0)	3 (0)	-	-	1 (0)	3,677
2018	3,762 (98)	51 (1)	5 (0)	3 (0)	-	-	1 (0)	3,822
2017	3,884 (98)	52 (1)	7 (0)	2 (0)	1 (0)	1 (0)	-	3,947
2016	4,011 (98)	57 (1)	5 (0)	2 (0)	1 (0)	1 (0)	-	4,077
2015	4,116 (98)	61 (1)	4 (0)	3 (0)	1 (0)	2 (0)	-	4,187
2014	4,280 (98)	55 (1)	7 (0)	3 (0)	2 (0)	2 (0)	-	4,349
2013	4,369 (98)	72 (2)	8 (0)	3 (0)	2 (0)	3 (0)	-	4,457
2012	4,479 (98)	75 (2)	9 (0)	4 (0)	3 (0)	3 (0)	-	4,573
2011	4,538 (98)	89 (2)	10 (0)	4 (0)	4 (0)	2 (0)	1 (0)	4,648
2010	4,642 (97)	99 (2)	9 (0)	6 (0)	4 (0)	5 (0)	1 (0)	4,766
2009	4,727 (97)	112 (2)	14 (0)	8 (0)	3 (0)	7 (0)	1 (0)	4,872
2008	4,743 (97)	122 (2)	22 (0)	8 (0)	2 (0)	8 (0)	1 (0)	4,906
2007	4,766 (96)	127 (3)	23 (0)	12 (0)	2 (0)	8 (0)	1 (0)	4,939
2006	4,801 (97)	119 (2)	25 (1)	7 (0)	4 (0)	9 (0)	1 (0)	4,966
2005	4,833 (97)	118 (2)	30 (1)	7 (0)	5 (0)	9 (0)	-	5,002
2004	4,854 (97)	116 (2)	31 (1)	9 (0)	4 (0)	9 (0)	-	5,023
2003	4,833 (96)	125 (2)	31 (1)	10 (0)	8 (0)	5 (0)	-	5,013
2002	4,831 (96)	119 (2)	31 (1)	12 (0)	8 (0)	5 (0)	-	5,007
2001	4,797 (96)	121 (2)	36 (1)	10 (0)	11 (0)	7 (0)	1 (0)	4,984
2000	4,776 (96)	132 (3)	35 (1)	19 (0)	9 (0)	4 (0)	2 (0)	4,978
1999	4,827 (96)	128 (3)	37 (1)	16 (0)	8 (0)	8 (0)	2 (0)	5,027
1998	4,912 (96)	127 (2)	42 (1)	17 (0)	9 (0)	8 (0)	1 (0)	5,117
1997	4,940 (96)	137 (3)	37 (1)	18 (0)	9 (0)	6 (0)	3 (0)	5,150
1996	4,994 (96)	149 (3)	22 (0)	14 (0)	12 (0)	13 (0)	3 (0)	5,207
1995	5,055 (96)	144 (3)	29 (1)	16 (0)	11 (0)	10 (0)	5 (0)	5,270
1994	5,195 (96)	130 (2)	26 (0)	16 (0)	10 (0)	10 (0)	4 (0)	5,391
1993	5,342 (97)	115 (2)	33 (1)	12 (0)	8 (0)	11 (0)	4 (0)	5,525
1992	5,494 (97)	112 (2)	35 (1)	14 (0)	5 (0)	12 (0)	3 (0)	5,675
1991	5,595 (97)	110 (2)	37 (1)	11 (0)	5 (0)	16 (0)	2 (0)	5,776
1990	5,621 (97)	96 (2)	37 (1)	15 (0)	7 (0)	13 (0)	2 (0)	5,791
1989	5,721 (97)	84 (1)	34 (1)	15 (0)	7 (0)	11 (0)	2 (0)	5,874
1988	5,730 (98)	73 (1)	36 (1)	10 (0)	4 (0)	12 (0)	2 (0)	5,867
1987	5,804 (98)	60 (1)	28 (0)	12 (0)	8 (0)	4 (0)	2 (0)	5,918

Sources:

1. FDIC Summary of Deposits;
2. Federal Reserve Bank of Chicago

Table A8. Bank Holding Companies: Number of States with Branches of Subsidiary Banks
Panel B. Number of bank holding companies that operate branches of subsidiary banks in one or more states

Year	Number of States									Total
	1	2	3	4	5	6-10	11-15	16-20	>20	
2021	2,867 (82)	392 (11)	97 (3)	35 (1)	23 (1)	42 (1)	9 (0)	8 (0)	7 (0)	3,480
2020	2,935 (83)	373 (11)	97 (3)	40 (1)	19 (1)	46 (1)	5 (0)	9 (0)	7 (0)	3,531
2019	3,089 (84)	370 (10)	103 (3)	31 (1)	21 (1)	40 (1)	8 (0)	8 (0)	7 (0)	3,677
2018	3,244 (85)	369 (10)	99 (3)	28 (1)	20 (1)	37 (1)	10 (0)	8 (0)	7 (0)	3,822
2017	3,376 (86)	368 (9)	93 (2)	26 (1)	25 (1)	34 (1)	10 (0)	7 (0)	8 (0)	3,947
2016	3,502 (86)	378 (9)	89 (2)	28 (1)	24 (1)	31 (1)	10 (0)	8 (0)	7 (0)	4,077
2015	3,630 (87)	365 (9)	84 (2)	32 (1)	22 (1)	31 (1)	8 (0)	7 (0)	8 (0)	4,187
2014	3,810 (88)	359 (8)	79 (2)	25 (1)	20 (0)	35 (1)	6 (0)	7 (0)	8 (0)	4,349
2013	3,923 (88)	353 (8)	84 (2)	27 (1)	17 (0)	31 (1)	7 (0)	7 (0)	8 (0)	4,457
2012	4,041 (88)	357 (8)	81 (2)	25 (1)	18 (0)	30 (1)	6 (0)	7 (0)	8 (0)	4,573
2011	4,124 (89)	352 (8)	80 (2)	28 (1)	16 (0)	29 (1)	7 (0)	7 (0)	5 (0)	4,648
2010	4,250 (89)	343 (7)	82 (2)	28 (1)	16 (0)	30 (1)	8 (0)	4 (0)	5 (0)	4,766
2009	4,355 (89)	347 (7)	78 (2)	33 (1)	15 (0)	27 (1)	8 (0)	4 (0)	5 (0)	4,872
2008	4,390 (89)	345 (7)	78 (2)	33 (1)	16 (0)	27 (1)	8 (0)	3 (0)	6 (0)	4,906
2007	4,440 (90)	331 (7)	76 (2)	31 (1)	15 (0)	29 (1)	7 (0)	5 (0)	5 (0)	4,939
2006	4,507 (91)	302 (6)	76 (2)	24 (0)	14 (0)	28 (1)	7 (0)	3 (0)	5 (0)	4,966
2005	4,568 (91)	292 (6)	64 (1)	23 (0)	15 (0)	27 (1)	6 (0)	3 (0)	4 (0)	5,002
2004	4,610 (92)	277 (6)	51 (1)	28 (1)	14 (0)	31 (1)	7 (0)	1 (0)	4 (0)	5,023
2003	4,607 (92)	277 (6)	53 (1)	22 (0)	9 (0)	33 (1)	7 (0)	2 (0)	3 (0)	5,013
2002	4,635 (93)	249 (5)	49 (1)	26 (1)	6 (0)	30 (1)	7 (0)	2 (0)	3 (0)	5,007
2001	4,629 (93)	234 (5)	50 (1)	20 (0)	7 (0)	34 (1)	6 (0)	(0)	4 (0)	4,984
2000	4,642 (93)	216 (4)	52 (1)	17 (0)	9 (0)	32 (1)	7 (0)	1 (0)	2 (0)	4,978
1999	4,709 (94)	208 (4)	47 (1)	18 (0)	6 (0)	30 (1)	5 (0)	2 (0)	2 (0)	5,027
1998	4,818 (94)	196 (4)	45 (1)	16 (0)	7 (0)	27 (1)	5 (0)	3 (0)	(0)	5,117
1997	4,883 (95)	173 (3)	40 (1)	18 (0)	10 (0)	19 (0)	6 (0)	1 (0)	(0)	5,150
1996	4,969 (95)	158 (3)	33 (1)	13 (0)	11 (0)	16 (0)	7 (0)	(0)	(0)	5,207
1995	5,047 (96)	146 (3)	30 (1)	15 (0)	14 (0)	12 (0)	6 (0)	(0)	(0)	5,270
1994	5,190 (96)	130 (2)	26 (0)	16 (0)	13 (0)	11 (0)	5 (0)	(0)	(0)	5,391
1993	5,334 (97)	117 (2)	33 (1)	14 (0)	8 (0)	13 (0)	6 (0)	(0)	(0)	5,525
1992	5,485 (97)	116 (2)	33 (1)	17 (0)	5 (0)	14 (0)	5 (0)	(0)	(0)	5,675
1991	5,585 (97)	114 (2)	36 (1)	13 (0)	7 (0)	18 (0)	3 (0)	(0)	(0)	5,776
1990	5,611 (97)	102 (2)	37 (1)	15 (0)	8 (0)	16 (0)	2 (0)	(0)	(0)	5,791
1989	5,712 (97)	89 (2)	33 (1)	15 (0)	10 (0)	13 (0)	2 (0)	(0)	(0)	5,874
1988	5,721 (98)	78 (1)	35 (1)	11 (0)	6 (0)	14 (0)	1 (0)	1 (0)	(0)	5,867
1987	5,795 (98)	64 (1)	29 (0)	12 (0)	10 (0)	6 (0)	1 (0)	1 (0)	(0)	5,918

Sources:

1. FDIC Summary of Deposits;
2. Federal Reserve Bank of Chicago

Table A9. Number of Bank Holding Companies and Number of States in which They Have Branches of Subsidiary Banks

Panel A: Multi-Bank Bank Holding Companies

Year	Number of States									Total
	1	2	3	4	5	6-10	11-15	16-20	>20	
2021	113 (56)	40 (20)	14 (7)	5 (2)	4 (2)	10 (5)	4 (2)	5 (2)	7 (3)	202
2020	126 (57)	42 (19)	15 (7)	7 (3)	4 (2)	10 (5)	3 (1)	7 (3)	6 (3)	220
2019	141 (58)	48 (20)	17 (7)	4 (2)	5 (2)	9 (4)	6 (2)	5 (2)	7 (3)	242
2018	149 (57)	56 (21)	21 (8)	4 (2)	4 (2)	8 (3)	8 (3)	6 (2)	7 (3)	263
2017	149 (57)	50 (19)	23 (9)	5 (2)	6 (2)	10 (4)	8 (3)	4 (2)	7 (3)	262
2016	166 (59)	58 (20)	21 (7)	7 (2)	6 (2)	7 (2)	7 (2)	4 (1)	7 (2)	283
2015	186 (60)	60 (19)	23 (7)	10 (3)	5 (2)	10 (3)	5 (2)	4 (1)	8 (3)	311
2014	200 (61)	64 (20)	22 (7)	7 (2)	4 (1)	14 (4)	4 (1)	4 (1)	8 (2)	327
2013	219 (61)	68 (19)	27 (8)	8 (2)	5 (1)	14 (4)	5 (1)	4 (1)	8 (2)	358
2012	239 (62)	76 (20)	26 (7)	8 (2)	5 (1)	15 (4)	5 (1)	4 (1)	8 (2)	386
2011	253 (60)	92 (22)	24 (6)	11 (3)	8 (2)	18 (4)	6 (1)	4 (1)	5 (1)	421
2010	267 (60)	94 (21)	27 (6)	13 (3)	7 (2)	21 (5)	7 (2)	3 (1)	5 (1)	444
2009	290 (61)	101 (21)	29 (6)	16 (3)	7 (1)	20 (4)	8 (2)	3 (1)	5 (1)	479
2008	316 (60)	109 (21)	36 (7)	17 (3)	8 (2)	21 (4)	8 (2)	2 (0)	6 (1)	523
2007	333 (61)	110 (20)	38 (7)	17 (3)	12 (2)	24 (4)	7 (1)	3 (1)	5 (1)	549
2006	341 (62)	103 (19)	44 (8)	10 (2)	12 (2)	23 (4)	6 (1)	2 (0)	5 (1)	546
2005	370 (64)	105 (18)	41 (7)	12 (2)	11 (2)	23 (4)	5 (1)	3 (1)	4 (1)	574
2004	395 (66)	106 (18)	32 (5)	17 (3)	11 (2)	24 (4)	6 (1)	1 (0)	4 (1)	596
2003	408 (66)	117 (19)	33 (5)	17 (3)	7 (1)	25 (4)	6 (1)	2 (0)	3 (0)	618
2002	442 (68)	114 (18)	31 (5)	22 (3)	5 (1)	24 (4)	6 (1)	2 (0)	3 (0)	649
2001	486 (69)	119 (17)	36 (5)	17 (2)	6 (1)	29 (4)	5 (1)	(0)	4 (1)	702
2000	520 (69)	131 (17)	38 (5)	15 (2)	9 (1)	28 (4)	7 (1)	1 (0)	2 (0)	751
1999	526 (69)	137 (18)	39 (5)	14 (2)	6 (1)	27 (4)	5 (1)	2 (0)	2 (0)	758
1998	568 (72)	134 (17)	37 (5)	14 (2)	6 (1)	27 (3)	5 (1)	3 (0)	-	794
1997	599 (73)	130 (16)	35 (4)	17 (2)	10 (1)	19 (2)	6 (1)	1 (0)	-	817
1996	609 (73)	142 (17)	31 (4)	13 (2)	11 (1)	16 (2)	7 (1)	-	-	829
1995	636 (74)	142 (17)	30 (4)	15 (2)	14 (2)	12 (1)	6 (1)	-	-	855
1994	659 (77)	128 (15)	26 (3)	16 (2)	13 (2)	11 (1)	5 (1)	-	-	858
1993	689 (78)	115 (13)	33 (4)	14 (2)	8 (1)	13 (1)	6 (1)	-	-	878
1992	732 (80)	114 (12)	33 (4)	16 (2)	5 (1)	14 (2)	5 (1)	-	-	919
1991	766 (80)	112 (12)	36 (4)	12 (1)	7 (1)	18 (2)	3 (0)	-	-	954
1990	791 (82)	98 (10)	37 (4)	15 (2)	8 (1)	16 (2)	2 (0)	-	-	967
1989	825 (84)	86 (9)	33 (3)	15 (2)	10 (1)	12 (1)	2 (0)	-	-	983
1988	839 (86)	73 (7)	35 (4)	11 (1)	6 (1)	13 (1)	1 (0)	1 (0)	-	979
1987	874 (88)	59 (6)	29 (3)	12 (1)	10 (1)	5 (1)	1 (0)	1 (0)	-	991
1986	829 (91)	47 (5)	21 (2)	8 (1)	5 (1)	4 (0)	2 (0)	-	-	916
1985	741 (92)	45 (6)	14 (2)	1 (0)	2 (0)	4 (0)	2 (0)	-	-	809
1984	577 (91)	39 (6)	12 (2)	1 (0)	3 (0)	4 (1)	1 (0)	-	-	637
1983	443 (91)	31 (6)	8 (2)	1 (0)	1 (0)	4 (1)	1 (0)	-	-	489
1982	355 (91)	22 (6)	5 (1)	1 (0)	4 (1)	1 (0)	1 (0)	-	-	389
1981	324 (94)	11 (3)	3 (1)	1 (0)	3 (1)	1 (0)	1 (0)	-	-	344

Sources:

1. FDIC Summary of Deposits;
2. Federal Reserve Bank of Chicago

Table A9. Number of Bank Holding Companies and Number of States in which They Have Branches of Subsidiary Banks

Panel B: One-Bank Bank Holding Companies

Year	Number of States									Total
	1	2	3	4	5	6-10	11-15	16-20	>20	
2021	2,754 (84)	352 (11)	83 (3)	30 (1)	19 (1)	32 (1)	5 (0)	3 (0)	-	3,278
2020	2,809 (85)	331 (10)	82 (2)	34 (1)	15 (0)	36 (1)	2 (0)	2 (0)	1 (0)	3,312
2019	2,951 (86)	321 (9)	87 (3)	27 (1)	16 (0)	31 (1)	2 (0)	3 (0)	-	3,438
2018	3,099 (87)	313 (9)	79 (2)	24 (1)	16 (0)	29 (1)	2 (0)	2 (0)	-	3,564
2017	3,226 (88)	318 (9)	70 (2)	21 (1)	19 (1)	24 (1)	2 (0)	2 (0)	1 (0)	3,683
2016	3,335 (88)	320 (8)	68 (2)	21 (1)	18 (0)	24 (1)	3 (0)	3 (0)	-	3,792
2015	3,444 (89)	305 (8)	61 (2)	22 (1)	17 (0)	21 (1)	3 (0)	3 (0)	-	3,876
2014	3,610 (90)	295 (7)	57 (1)	18 (0)	16 (0)	21 (1)	2 (0)	3 (0)	-	4,022
2013	3,704 (90)	285 (7)	57 (1)	19 (0)	12 (0)	17 (0)	2 (0)	3 (0)	-	4,099
2012	3,802 (91)	281 (7)	55 (1)	17 (0)	13 (0)	15 (0)	1 (0)	3 (0)	-	4,187
2011	3,871 (92)	260 (6)	56 (1)	17 (0)	8 (0)	11 (0)	1 (0)	3 (0)	-	4,227
2010	3,983 (92)	249 (6)	55 (1)	15 (0)	9 (0)	9 (0)	1 (0)	1 (0)	-	4,322
2009	4,065 (93)	246 (6)	49 (1)	17 (0)	8 (0)	7 (0)	-	1 (0)	-	4,393
2008	4,074 (93)	236 (5)	42 (1)	16 (0)	8 (0)	6 (0)	-	1 (0)	-	4,383
2007	4,107 (94)	221 (5)	38 (1)	14 (0)	3 (0)	5 (0)	-	2 (0)	-	4,390
2006	4,166 (94)	199 (5)	32 (1)	14 (0)	2 (0)	5 (0)	1 (0)	1 (0)	-	4,420
2005	4,198 (95)	187 (4)	23 (1)	11 (0)	4 (0)	4 (0)	1 (0)	-	-	4,428
2004	4,215 (95)	171 (4)	19 (0)	11 (0)	3 (0)	7 (0)	1 (0)	-	-	4,427
2003	4,199 (96)	160 (4)	20 (0)	5 (0)	2 (0)	8 (0)	1 (0)	-	-	4,395
2002	4,193 (96)	135 (3)	18 (0)	4 (0)	1 (0)	6 (0)	1 (0)	-	-	4,358
2001	4,143 (97)	115 (3)	14 (0)	3 (0)	1 (0)	5 (0)	1 (0)	-	-	4,282
2000	4,122 (98)	85 (2)	14 (0)	2 (0)	-	4 (0)	-	-	-	4,227
1999	4,183 (98)	71 (2)	8 (0)	4 (0)	-	3 (0)	-	-	-	4,269
1998	4,250 (98)	62 (1)	8 (0)	2 (0)	1 (0)	-	-	-	-	4,323
1997	4,284 (99)	43 (1)	5 (0)	1 (0)	-	-	-	-	-	4,333
1996	4,360 (100)	16 (0)	2 (0)	-	-	-	-	-	-	4,378
1995	4,411 (100)	4 (0)	-	-	-	-	-	-	-	4,415
1994	4,531 (100)	2 (0)	-	-	-	-	-	-	-	4,533
1993	4,645 (100)	2 (0)	-	-	-	-	-	-	-	4,647
1992	4,753 (100)	2 (0)	-	1 (0)	-	-	-	-	-	4,756
1991	4,819 (100)	2 (0)	-	1 (0)	-	-	-	-	-	4,822
1990	4,820 (100)	4 (0)	-	-	-	-	-	-	-	4,824
1989	4,887 (100)	3 (0)	-	-	-	1 (0)	-	-	-	4,891
1988	4,882 (100)	5 (0)	-	-	-	1 (0)	-	-	-	4,888
1987	4,921 (100)	5 (0)	-	-	-	1 (0)	-	-	-	4,927
1986	5,076 (85)	6 (0)	(0)	(0)	-	-	-	-	-	5,082
1985	5,053 (86)	4 (0)	(0)	(0)	-	-	-	-	-	5,057
1984	4,734 (88)	4 (0)	(0)	(0)	-	-	-	-	-	4,738
1983	4,174 (89)	5 (0)	1 (0)	1 (0)	-	-	-	-	-	4,181
1982	3,479 (90)	5 (0)	1 (0)	1 (0)	-	-	-	-	-	3,486
1981	2,781 (89)	6 (0)	1 (0)	2 (0)	-	-	-	-	-	2,790

Sources:

1. FDIC Summary of Deposits.
2. Federal Reserve Bank of Chicago

Table A10. Bank Holding Companies: Numbers and Deposits

Panel A: Interstate Bank Holding Companies

Year	Number of BHCs with banks in more than one state	Number of BHCs with branches in more than one state	Deposits of BHCs with banks in more than one state (\$ Billions)	Deposits of BHCs with branches in more than one state (\$ Billions)
2021	50	613	7,108	13,341
2020	52	596	6,161	12,242
2019	53	588	4,921	9,826
2018	60	578	4,912	9,436
2017	63	571	4,849	9,011
2016	66	575	5,060	8,560
2015	71	557	4,905	7,995
2014	69	539	4,944	7,592
2013	88	534	4,595	7,048
2012	94	532	4,633	6,546
2011	110	524	4,181	5,913
2010	124	516	3,693	5,335
2009	145	517	3,912	5,180
2008	163	516	3,325	4,502
2007	173	499	3,254	4,199
2006	165	459	3,177	4,065
2005	169	434	2,888	3,669
2004	169	413	2,631	3,328
2003	180	406	2,547	3,145
2002	176	372	2,229	2,732
2001	187	355	2,091	2,549
2000	202	336	1,996	2,359
1999	200	318	1,901	2,209
1998	205	299	1,847	2,076
1997	210	267	1,758	1,879
1996	213	238	1,719	1,753
1995	215	223	1,614	1,633
1994	196	201	1,491	1,499
1993	183	191	1,420	1,480
1992	181	190	1,383	1,445
1991	181	191	1,340	1,402
1990	170	180	1,305	1,356
1989	153	162	1,209	1,254
1988	137	146	1,102	1,146
1987	114	123	944	989

Sources:

1. FDIC Summary of Deposits.
2. Federal Reserve Bank of Chicago

Table A10. Bank Holding Companies: Numbers and Deposits

Panel B: Intrastate Bank Holding Companies

Year	Number of BHCs with banks in more than one county	Number of BHCs with branches in more than one county	Deposits of BHCs with banks in more than one county (\$ Billions)	Deposits of BHCs with branches in more than one county (\$ Billions)
2021	88	1,579	361	469
2020	101	1,599	296	416
2019	108	1,667	267	408
2018	114	1,737	256	448
2017	113	1,784	248	472
2016	125	1,812	216	452
2015	141	1,841	191	426
2014	150	1,890	170	451
2013	163	1,919	160	419
2012	181	1,952	145	431
2011	195	1,987	157	482
2010	199	2,024	133	472
2009	218	2,038	133	474
2008	242	2,034	132	489
2007	261	2,000	136	510
2006	273	1,952	133	552
2005	288	1,908	127	582
2004	309	1,863	120	625
2003	328	1,822	121	664
2002	351	1,755	122	711
2001	377	1,677	114	749
2000	393	1,624	102	770
1999	400	1,554	123	831
1998	432	1,513	125	829
1997	453	1,460	124	825
1996	467	1,362	126	843
1995	491	1,312	114	854
1994	501	1,248	111	914
1993	535	1,217	123	949
1992	567	1,176	112	983
1991	599	1,100	107	1,007
1990	615	1,004	127	1,016
1989	631	927	130	1,024
1988	642	870	143	1,101
1987	653	793	63	1,356

Sources:

1. FDIC Summary of Deposits.
2. Federal Reserve Bank of Chicago

Appendix 2. Intrastate Banking/Branching Deregulation Index

State	Prohibited Branching within State as of Year	Limited areas of Branching within state as of Year	Statewide Branching through M&As Permitted as of Year	Statewide Branching Permitted as of Year
<i>Alabama (AL)</i>	1929	1939	1981	1990
Alaska (AK)	*	*	1960	1960
Arizona (AZ)	*	*	*	1929
<i>Arkansas (AR)</i>	1929	1979	1994	1999
California (CA)	*	*	*	1910
Colorado (CO)	1910	*	1991	1997
Connecticut (CT)	1910	*	1980	1988
Delaware (DE)	*	*	*	1910
<i>Washington (DC)</i>	*	*	1960	1960
<i>Florida (FL)</i>	1929	1979	1988	1910, 1988
<i>Georgia (GA)</i>	1910	1929	1983	1998
Hawaii (HI)	*	*	1986	1986
Idaho (ID)	1929	*	*	1933
Illinois (IL)	1929	*	1988	1993
Indiana (IN)	1929	1939	1989	1991
Iowa (IA)	1929	1979	1997	2010
Kansas (KS)	1929	*	1987	1990
<i>Kentucky (KY)</i>	*	1960	1990	2001
<i>Louisiana (LA)</i>	1910	*	1988	1988
Maine (ME)	1910	*	1975	1975
<i>Maryland (MD)</i>	*	*	*	1929
Massachusetts (MA)	1910	1929	1984	1984
Michigan (MI)	*	1961	1987	1939, 1988
Minnesota (MN)	1929	1990	1993	2010
<i>Mississippi (MS)</i>	1910	1929	1986	1989
Missouri (MO)	1910	*	1990	1990
Montana (MT)	1929, 1979	1939	1990	1997
Nebraska (NE)	1929	*	1985	2010
Nevada (NV)	1910	*	*	1939
New Hampshire (NH)	*	1979	1987	1987
New Jersey (NJ)	*	1929	1977	1996
New Mexico (NM)	1929	1961	1991	1991
New York (NY)	1910	*	1976	1979
<i>North Carolina (NC)</i>	*	*	*	1921
North Dakota (ND)	1939	*	1987	1996
Ohio (OH)	*	1929	1979	1989

Oklahoma (OK)	1961	*	1988	2000
Oregon (OR)	1929	*	1985	1985
Pennsylvania (PA)	1910	1929	1982	1989
Rhode Island (RI)	*	*	*	1910
<i>South Carolina (SC)</i>	*	*	*	1929
South Dakota (SD)	*	*	*	1939
<i>Tennessee (TN)</i>	1929	*	1985	1990
Texas (TX)	1910	*	1988	1988
Utah (UT)	1929	*	1981	1981
Vermont (VT)	*	*	1970	1970
<i>Virginia (VA)</i>	*	1961	1978	1929, 1987
Washington (WA)	1929	*	1985	1985
West Virginia (WV)	1929	*	1987	1987
Wisconsin (WI)	1910	1979	1990	1989
Wyoming (WY)	1979	*	1988	1999

* Indicates data are unavailable.

Sources: Mengle (1990), Barth and Brumbaugh (1993), Swamy, et al. (1996), and Demyanenko et al. (2007).

Appendix 3. Variable Definition and Source

Name and Acronym		Description	Sources
Gravity model			
Population ratio	$\ln \text{Pop}_i/\text{Pop}_j$	Natural logarithm ratio of the total population of BHC headquarter county to the total population of foreign county within the same state	US Census, calculated by authors SOD, Calculated by authors
Distance	$\ln(\text{Distance})$	Natural logarithm of Geographic Distance between the BHC headquarters and the average location of the subsidiary banks/branches in foreign county within the same state	
Share Intrastate Banking Deregulation Index	Share	Share of deposits a BHC holds through its banks/branches in foreign county	Constructed by authors
	IBDI	intrastate banking/branching deregulation index	
IV Regression model			
Cost of funds	Cost of funds	Total interest expenses adjusted quarterly (RIAD4073) divided by Total liabilities held at the beginning of the quarter.	Reports of condition and income (call reports), calculated by authors
Cost of deposits	Cost of deposits	Deposit interest expense adjusted quarterly Total deposits held at the beginning of the quarter.	
Capital-asset ratio	Capital-asset ratio	The fraction of bank equity (RCON3210) over total assets(RCON2170)	
Return on assets	Return on Assets	Net income(RIAD4340) divided by Total assets (RCON2170) measured at the beginning of the period	SOD, Calculated by authors
Total assets	$\ln(\text{TA})$	Log of the book value of total assets(RCON2170) in million U.S. dollars, measured at the beginning of a period	
Market Concentration Number of counties	Market Concentration	Herfindahl index of bank asset concentration in a holding company’s market, defined as the sum of squared share of total assets among all the bank institutions operated in a Metropolitan Statistical Area (MSA) (We impose a value of one for non-MSA.)	
Variance of deposit shares	N	Total number of counties in which the BHC holds branches	SOD, Calculated by authors
	V	Variance of deposit shares	
1-HHI	1-HHI	Bank geographic diversification which is one minus the Herfindahl index of deposits held through branches across different counties.	
Channels			
Cost of capital	w3	Expenditures on fixed assets (riad 4217) divided by premises and fixed assets (rcfd 2145)	Reports of condition and income (call reports), calculated by authors
Cost of labor	w1	Salaries (riad 4135) divided by full-time equivalent employees (riad 4150)	
Cost of funds	w2	Total interest expenses adjusted quarterly (RIAD4073) divided by Total liabilities held at the beginning of the quarter.	
Cost of credit risk	w4	Provisions for credit losses(RIAD4230) divided by at Total loans on a consolidated basis quarterly average(RCON3360)	

Price of output	P	Ratio of total income(total noninterest income (RIAD4079) and total interest income(RIAD4107)) divided by Total assets (RCON2170)	
Total assets	Total assets	Book value of Total Assets(RCON2170)	
Total Deposits	Total Deposits	Total Domestic deposits	
Total Cost	C	Total expenses of fixed assets, salaries, provisions for credit losses	
Lerner Index	L	Difference of Price and Marginal cost expressed as a percentage of price	
Marginal Cost	MC	Marginal cost as calculated from translog cost function	
Disaster Correlation	Disaster_Corr	Correlation of disaster measures (i.e., currency damage to property, number of people injured, and currency damage to crop, etc.) between BHC headquarter and counties where BHC holds branches	SHELDUS dataset, calculated by authors
Properties per capital	Properties per capital	The total currency damage to properties and total currency damage to properties per capital in all expanded counties of a BHC.	
Robustness Tests			
Asset Growth	Asset Growth	Growth in Total Assets	Reports of condition and income (call reports), calculated by authors
Total Loans/Total Assets	Total Loans/Total Assets	Total Loans (RCON2122) divided by Total Assets (RCON2170)	
Noninterest Profit Multi-Bank Holding Company	Noninterest Profit	Noninterest income divided by total operating income	
Percentage of National Banks	MBHC National Banks (%)	Dummy for Multi-Bank Holding Company	
Noninterest income/Total operating income	Noninterest income/Total operating income	Percentage of banks under the BHC holding Fed Charter	
Earning Assets Growth	Earning Assets Growth	Total noninterest income(RIAD4079) divided by Total operating income	
Small Bank Share Capital Difference	Small Bank Share Capital Difference	Growth in Total Earning Assets	
Percentage of Full-Service branches	Full Service Branches (%)	Percentage of banking assets in a state held by banks below the median size of banks in each state	
Inter IBDI	Inter IBDI	Capital-to-assets ratio of small banks minus that of large banks	SOD, calculated by authors
Unemployment rate	Unemployment rate	Percentage of Full-Service branches of a BHC	Rice and Strahan (2010)
Gross State Product	Gross State Product	Interstate deregulation index by Rice and Strahan (2010)	Bureau of Labor Statistics
Political Indicator	Democratic State	Unemployment rate of a state	
		Gross Domestic Product of a state	US Census
		Dummy for state where majority seats are held by Democratic	Federal Election Commission

Appendix 4. Market Power Calculation

We can write the Lerner index of a BHC b for quarter t as follows:

$$L_{bt} = \frac{P_{bt} - MC_{bt}}{P_{bt}}$$

Here, P_{bt} is the average price of the output of BHC b in time t . We calculate price by the ratio of Total Income to Total Assets. MC_{bt} is the marginal cost of bank b in time t . Similar to Jiménez et al. (2013), we also adjust for credit risk faced by BHCs because higher difference between price and marginal cost could be due to higher credit risk faced by BHCs. The cost is calculated by translog cost function:

$$\begin{aligned} \ln(C_{bt}) = & \alpha_0 + \alpha_1 \ln Q_{bt} + \frac{1}{2} \alpha_k (\ln Q_{bt})^2 + \sum_{j=1}^4 \beta_j \ln \omega_{jbt} + \frac{1}{2} \sum_{j=1}^4 \sum_{k=1}^4 \beta_{jk} \ln \omega_{jbt} \ln \omega_{kbt} \\ & + \frac{1}{2} \sum_{j=1}^4 \gamma_j \ln Q_{bt} \ln \omega_{jbt} + \mu_1 Trend + \frac{1}{2} \mu_2 Trend^2 + \mu_2 Trend \ln Q_{bt} \\ & + \sum_{j=1}^4 \delta_j Trend \ln \omega_{jbt} + v_i + u_{bt} \end{aligned}$$

where C is total costs including financial costs, operating costs, and provisions of BHC b at time t . Q is the total output of the BHC and ω is the price of different inputs of production. Here we consider output as Total Assets and alternatively Total Deposits. To control BHC characteristics, we include BHC fixed effects. We also control for technical changes in the cost function over time by including Trend. The price of four inputs are as follows:

- ω_1 = Price of labor = Salary of labor/Number of employees
- ω_2 = Price of loanable funds = Total cost of funds/Total liabilities
- ω_3 = Price of capital = Total operating cost/Total Fixed Assets
- ω_4 = Price of credit risk = Provisions/Total loans

We estimate the Total Cost and use the estimated parameters to calculate the marginal cost. We substitute the values in the Lerner index formula to calculate the Lerner Index for BHC b in quarter t .