The Private Benefits of Controlling Complex Bank Holding Companies

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Abstract: This paper assesses the impact of the geographic diversification of bank holding company (BHC) assets across the United States on (1) their market valuations and (2) the generosity of their loans to bank executives. We find that exogenous increases in geographic diversity reduce BHC valuations and increase the frequency and size of insider loans. These findings are consistent with the view that geographic diversity makes it more difficult for shareholders and creditors to monitor bank executives, allowing corporate insiders to extract larger private benefits from controlling complex BHCs.

JEL Classifications: G34, L22, G21, G24

Keywords: Agency problems; Economies of scope; Insider lending; Tobin's *q*; Corporate diversification

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1. Introduction

Are complex financial conglomerates too opaque for small shareholders to monitor, allowing corporate insiders to extract large private rents with detrimental ramifications on the conglomerates? Theoretical research by Jensen (1986), Jensen and Meckling (1986), and Scharfstein and Stein (2000) suggests that corporate insiders, such as controlling owners and managers, will have greater latitude to extract private benefits – such as insider loans at favorable terms, generous compensation packages, and other perquisites – from a financial institution that is engaged in a large diversity of activities, if small shareholders find it difficult to monitor such diversity. Similarly, insiders might find it easier to extract private rents from geographically diversified bank holding companies (BHCs) if diffuse shareholders and creditors cannot exert effective corporate governance over such physically dispersed entities. Although diversification that intensifies agency problems will reduce market valuations, insiders will still seek diversification if their additional private benefits are greater than their own losses from the corporation's lower value.

Alternatively, some theories suggest that conducting a diversity of financial activities and operating across a diversity of geographic areas will facilitate both the governance and efficient operation of financial institutions. For example, seminal theories of banks—Diamond (1984) and Boyd and Prescott (1986)—suggest that it is easier for outside investors to monitor banks with diversified portfolios than more narrowly focused banks because it is less complicated to evaluate diversification than it is to assess the idiosyncrasies of the particular investments of more specialized banks. Thus, diversified banks might be easier to govern than more focused institutions, boosting market valuations. Furthermore, economies of scale (Chandler, 1977; Berger, Demsetz, and Strahan, 1999) and the internalization of market failures (Gertner,

Scharfstein, and Stein, 1994; Houston, James, and Marcus, 1997) can improve the comparative performance, and reduce the funding costs, of large banks. And, banks that diversify across markets may reduce their sensitivity to local shocks, lowering the likelihood of costly bankruptcies, thereby boosting market valuations. Furthermore, research by Rajan (1992), Saunders and Walter (1994) and Stein (2002) suggests that banks that simultaneously issue loans and underwrite securities reduce duplication of information acquisition, leading to economies of scope. From this perspective, even if diversity were to intensify agency frictions, the efficiency gains from diversity could increase the comparative value of more complex financial institutions.

In seeking to resolve the debate about the overall impact of diversity on the performance and valuation of financial institutions, researchers have had difficulties identifying the causal impact of diversity—either diversity of financial activities or geographic diversity. Laeven and Levine (2007) examine an international cross-section of banks and find a diversification discount: markets value conglomerates that engage in multiple financial activities lower than if those conglomerates were broken into separate, specialized financial intermediaries. This is consistent with the view that activity complexity intensifies agency problems. Although they use instrumental variables, concerns remain about causality since it is difficult to find valid sources of exogenous variation in bank diversification in a pure cross-section of banks around the world. Within the United States, Deng and Elyasiani (2008) find that the geographic diversification of BHC subsidiaries across the country's states is associated with a reduction in the cost of capital and equity risk. But, causality remains a concern. Higher-valued banks might be more likely to diversify geographically than lower-valued BHCs.

In this paper, we design and implement a new empirical strategy to identify the impact of the geographic diversification of BHCs across the states of the United States on both the valuation

of those BHCs and the degree to which they provide generous loans to executives. Thus, we contribute to the debate surrounding the impact of diversity on valuation and performance of financial conglomerates by focusing on the geographic diversification of BHCs.

Our focus on the geographic diversity of BHC assets across the United States requires explanation and justification. The current policy debate is about the diversity of activities within financial conglomerates, not about U.S. BHCs diversifying geographically in the 1980s and 1990s, raising questions about the relevance of our study for contemporary policy concerns. However, several factors motivate our focus on geographic diversity in the United States. First, as we explain below, the time-varying, cross-state heterogeneity in the repeal of regulatory restrictions on the geographic diversity of BHC subsidiaries provides a natural setting for identifying the impact of diversity on valuations. Second, U.S. bank regulators collect data on insider loans. Thus, by assessing the impact of geographic diversification on insider loans, we move beyond a simple examination of diversification and Tobin's *q*. We study the effect of diversification on a specific executive decision: Does diversification affect how much bank executives lend themselves? Third, our priors were that geographic diversity within a single country should primarily have positive effects through lower funding costs and reducing the risk of bankruptcy, with only minor countervailing effects from the intensification of agency problems in correspondingly more complex BHCs. If intensified agency problems from something as simple as diversifying assets across the states of the United States dominate the positive effects from diversification, then this would provide suggestive evidence about the large private benefits associated with controlling complex financial conglomerates engaged in wide-array of opaque activities around the world.

To draw causal inferences, we exploit the cross-state, cross-time variation in the removal of interstate banking prohibitions to identify an exogenous increase in BHC diversification and

evaluate the resultant impact on *q* and the nature of loans to bank executives. From the late 1970s through the mid-1990s, the individual states of the United States removed restrictions on the entry of bank subsidiaries from other states. Not only did states start deregulating in different years, states signed bilateral and multilateral reciprocal interstate banking agreements over time in a somewhat chaotic manner. Thus, there is enormous cross-state, cross-year variation in the twenty-year *process* of interstate bank deregulation. Interstate bank deregulation increased the geographic BHC diversification as they established subsidiaries in other states.

There are good economic reasons for treating the process of interstate bank deregulation as exogenous to bank valuation and performance. Restrictions on interstate banking protected banks from competition for much of the 20th century. By the 1970s, technological innovations had reduced the protective value of these restrictions. For example, Kroszner and Strahan (1999) find that checkable money market mutual funds facilitated banking by mail and phone, and improvements in data processing, telecommunications, and credit scoring weakened the informational advantages of local banks. As these innovations took root, banks became less willing to fight for the maintenance of protective banking prohibitions. And, as we show, there is great heterogeneity in the signing of bilateral and multilateral reciprocal interstate banking agreements. Thus, states differed both in terms of when they started interstate deregulation and the subsequent time-series pattern of reciprocal agreements that culminated with the Riegle-Neal Interstate Banking Act of 1995. We find no indication that bank valuations or insider lending affected the timing of deregulation. Thus, the process of interstate bank deregulation provides a natural laboratory for evaluating the impact of BHC diversification on *q* and insider lending.

We employ two instrumental variable strategies for evaluating the impact of diversity on BHCs. In the first strategy, we use instrumental variables based on deregulation at the state level.

As discussed, these instruments have different dynamic patterns for different states. Although researchers have examined interstate bank deregulation, they treat it as a single, discrete event, typically dating deregulation as the year in which a state first allows banks from any other state to enter. We believe that we are the first to exploit the state-specific dynamics of deregulation. But, in this first strategy, our treatment does not have a BHC-specific component. Rather, we examine the dynamic impacts of "exogenous" increases in the diversity of the "average BHC" in a state on the evolution of Tobin's *q* and insider lending.

The second instrumental variable strategy exploits both the cross-state dynamic process of interstate bank deregulation and a gravity model of the establishment of bank subsidiaries across state boundaries to identify the impact of diversity on individual BHCs. Inspired by Frankel and Romer's (1999) study of international trade and economic growth, we construct a BHC-specific instrument for diversity in the following manner. First, for each BHC in each period, we use a gravity model to estimate the amount of assets it will hold in each "foreign" state, conditional on there being no regulatory prohibitions on establishing a subsidiary in that state. Second, based on this estimate—and imposing a zero when and where there are regulatory prohibitions on interstate banking, we construct estimates of the projected geographic diversity of each BHC in each period. This *gravity-deregulation* model of the geographic diversification produces the instrumental variable that we employ to identify the impact of geographic diversity on Tobin's *q* and insider lending at a BHC level. Thus, in this second strategy, we examine the impact of "exogenous" increases in the diversity of *each* BHC on its *q* and insider lending.

We find that increases in geographic diversity reduce BHC valuations, suggesting that diversification intensifies agency problems within BHCs. This finding holds after controlling for BHC fixed effects, state-quarter fixed effects, along with a wide-array of time-varying BCH

characteristics, such as size, profitability, and market competition. Even when conditioning on the degree to which the BHC engages in a diversity of activities, there is still a significant, negative impact of geographic diversity on *q*. Furthermore, we conduct several tests that suggest that the results are not driven by changes in the accounting value of assets, or other oddities, around the time of mergers and acquisitions. Both instrumental variable strategies produce consistent results: (1) diversity lowers *q* and (2) the absolute values of the instrumental variable estimates are larger than the least squares estimates. This suggests that reverse causality biases the results against the finding that diversity intensifies agency problems within BHCs.

These results are inconsistent with the view that diversification lowers BHC risk and the costs of external funds enough to overcome the adverse ramifications of geographic diversity on valuations. Rather, the findings are consistent with the view that geographic diversification makes it easier for insiders to extract private benefits with adverse repercussions on *q*. But, these results do not provide evidence of any particular, harmful actions by insiders. Thus, we deepen the analyses by studying the generosity of loans to bank executives.

In extending the investigation to insider lending, we find that increases in the geographic diversity of BHC assets (1) increases the frequency of loans to bank insiders, and (2) boosts the size of these loans. Again, the results are robust to an assortment of sensitivity analyses. While much work remains on documenting how diversity affects the actions of BHC insiders, the results on insider loans suggest that geographic diversity makes it more difficult for small shareholders to monitor the behavior of executives and executives exploit this intensified agency friction by granting themselves more frequent and more generous loans. We are not arguing that insider lending is the only mechanism through which diversity lowers *q*, nor are we arguing that insider lending is the main mechanism linking diversity and *q*. We simply present the insider lending

results because they show that an exogenous increase in diversity is associated with bank executives granting more, and larger, loans to themselves.

In this paper, we focus on the cross-state diversity of BHC assets. We do not examine all forms of diversity. For example, although we control for the diversity of BHC activities in assessing the independent link between geographic diversity and both BHC *q* and insider lending behavior, we do not examine the causal impact of activity diversity on BHCs. Rather, we focus on the geographic diversity of BHC assets across states because the state-specific, time-varying process of interstate bank deregulation provides a natural source of exogenous variation in geographic diversity. This is both a strength, and limitation, of our investigation.

This paper relates to an influential line of research on the pros and cons of cross-economy banks. For instance, Goldberg (2009), Kroszner (2008), and Morgan, Rime, and Strahan (2004) advertise the efficiency gains and reduced volatility from cross-economy banking and financial integration. In contrast, Liberti and Mian (2009), Mian (2008), and Degryse, Laeven, and Ongena (2009) argue that the effectiveness of banking deteriorates as distance between bank and borrower increases. Our paper shows that increases in the geographic diversity of BHCs lowers market valuations and increases insider lending, suggesting that BHC complexity intensifies agencies problems. But, we do not assess the overall welfare implications of diversification.

Our approach complements the research strategy for dissecting the direct impact of diversity on particular bank costs. Empirically, however, it has proven extraordinarily difficult to design and estimate appropriate cost functions for financial conglomerates and come to any sort of consensus (Berger and Humphrey, 1991; Berger, Hanweck, Humphrey, 1987; Ferrier et al, 1993). Drucker and Puri (2005) find that conglomerates that combine lending and investment banking activities tend to charge lower fees. However, while diversification may provide cost

savings to some clients, diversification might still enhance the ability of insiders to expropriate financial institution resources for private gain and thereby lower the conglomerate's market value. Rather than attempting to measure economies of scope and agency problems directly, we investigate whether the geographic diversity of BHCs influences their market valuations.

The paper is organized as follows. Section 2 summarizes the data and discusses the use of interstate bank deregulation as an exogenous source of variation in BHC diversification. Section 3 provides the ordinary least squares results on market valuation, while Sections 4 and 5 discuss the instrumental variable findings on valuations and insider loans. Section 6 concludes.

2. Data and interstate bank deregulation

2.1 Sources

We use balance sheet information on BHCs and chartered banks regulated by the Federal Reserve System, Federal Deposit Insurance Corporation, and the Comptroller of the Currency. For BHCs, data are collected on a quarterly basis by the Federal Reserve and published in the Financial Statements for Bank Holding Companies. Since June 1986, domestic BHCs report their consolidated balance sheet, income statement, and detailed supporting schedules to the Federal Reserve.[1] Furthermore, all banking institutions regulated by the Federal Deposit Insurance Corporation, the Federal Reserve, or the Office of the Comptroller of the Currency file Reports of Condition and Income, known as Call Reports, which include balance sheet and income data on a quarterly basis. Call Reports also report the identity of the entity that holds at least 50% of a banking institution's equity stake (item rssd9364). We use this variable to match information on

[1] The corresponding reporting form is called FR Y-9X. More information is available at: http://www.federalreserve.gov/reportforms/ReportDetail.cfm?WhichFormId=FR Y-9C.

banks to their parent BHCs.

Information on Market Capitalization of publicly traded BHCs is obtained from the Center of Research in Security Prices (CRSP), where we use the end of quarter market capitalization for all registered BHCs in the United States, and aggregate state level data on social and economic demographics are obtained from the Bureau of Economic Analysis.

In terms of interstate deregulation, Amel (1993) and our own updates provide information on changes in state laws that affect the ability of commercial banks to expand across state borders. Commercial banks in the U.S. were prohibited from entering other states due to regulations. Over the period from 1978 through 1994, states removed these restrictions by either (1) unilaterally opening their state borders and allowing out-of-state banks to enter or (2) signing reciprocal bilateral and multilateral branching agreements with other states and thereby allowing out-of-state banks to enter. The Riegle-Neal Act of 1994 repealed the prohibition on BHCs headquartered in one state from acquiring banks in other states. Amel (1993) reports for each state and year, the states in which it's BHCs can open subsidiary banks. We confirmed the dating of the state-by-state relaxation of interstate banking restrictions in Amel (1993) and extended the data through 2007.

2.2 Geographic diversification

For each bank holding company and quarter, we determine its distribution of assets across the U.S. We use four variables to capture the extent of a BHC's geographic diversification. First, we use a dummy variable that takes on the value of one if a bank holding company has subsidiaries in more than one state, and zero otherwise. Additionally, we compute the share of a holding company's assets that are held in out-of-state affiliates, i.e., subsidiaries not located in the same state as the bank holding company. Our third measure of geographic diversification is a bank

holding company's concentration of assets across states. We measure this by calculating the Herfindahl-Hirschman Index of a BHC's assets in each state in which it is active. To construct a measure that is increasing in the degree of geographic diversification, we subtract the value of this Herfindahl Index from one, and use this as our third measure of geographic diversification. Our final measure of geographic diversification is the average distance (in miles) between the BHC's headquarters and its affiliated subsidiaries. We compute this distance measure using information on the location of counties in which the holding company and its subsidiaries are located.

2.3 Insider lending

To assess whether and how the geographic diversity of BHC assets affects the behavior of corporate insiders, we examine the incidence, and size of bank loans to executive officers. Regulation O governs credit by a bank to its executive officers. In particular, Regulation O (1) stipulates limits on the amount of credit that a bank can extend to its executive officers, and (2) sets forth reporting requirements for banks to disclose their lending to executive officers. Each member bank of the Federal Reserve System is required to report all credit extended by the bank to its executive officers since the date of the previous Call Report. This part of the analysis focuses on the subsidiaries of BHCs since information on insider loans is collected at the subsidiary level, not at the holding company level. Further, information on loans to executive officers is available from the first quarter of 1988 until the last quarter of 2006.

We use the following two measures of insider lending. First, Lending Indicator is a dummy variable that equals one if a bank makes at least one loan to an executive officer in a quarter, and zero otherwise. Second, Ln (Average loan size) measures the size of the average insider loan in a

quarter and is computed as the natural logarithm of one plus the total amount of loans divided by the total number of number of loans.

2.4 Activity Diversity

In our analyses, we account for differences in the diversity of BHCs' financial activities in order to focus on the independent impact of geographic diversity on BHC behavior. Laeven and Levine (2007) show that financial institutions that combine lending activities and non-lending activities (such as underwriting and investment banking) have lower market values. We use their empirical proxies of activity diversity to control for diversification across different financial activities. First, we compute their index of income diversity (Income Diversity). The index takes on values between zero and one, where larger values imply that the BHC's income is more diversified across lending and non-lending based sources of income, and is computed as follows:

$$\text{Income Diversity} = 1 - \left| \frac{\text{Net Interest Income} - \text{Total Noninterest Income}}{\text{Total Operating Income}} \right|.$$

Net interest income is Total interest income minus Total interest expenses. Other operating income includes net fee income, net commission income, and net trading income.

Second, we compute their index of asset diversity based on the allocation of BHC assets across lending and non-lending activities (Asset Diversity). We use a similar formula as that used to compute the index of income diversity:

$$\text{Asset Diversity} = 1 - \left| \frac{\text{Net Loans} - \text{Other Earning Assets}}{\text{Total Earning Assets}} \right|.$$

Net loans is Total loans net of loan loss provisions, and Other earning assets include all earning assets other than loans (such as Treasuries and other fixed income securities, including mortgage-backed securities).

2.5 Other Controls

To account for other influences, we control for several bank-specific as well as state-specific characteristics. To capture differences in the size of BHCs, we include the natural log of total assets, the natural log of operating income, as well as the growth rate of these two variables. In further robustness tests, we also include the ratio of bank capital to total assets and its return on equity. To control for time-varying, state-specific characteristics, we include the median level of *q*, the concentration of banking assets, and the real growth rate of state personal income in our regression models.

2.6 Sample Construction

Our sample of BHCs is constructed as follows. We first match subsidiaries of BHCs to their ultimate parent company using information from the Call Reports. Specifically, each subsidiary reports its unique parent company, and there can be several layers of subsidiaries and parent companies before the ultimate parent company is reached. We assign a subsidiary to the parent BHC that owns at least 50% of the subsidiary's equity. We only focus on BHCs located in the U.S. and therefore drop holding companies chartered in Puerto Rico. Furthermore, we eliminate BHCs that change the location of their headquarters across states during the sample period. This is an exceeding small number of institutions, and the results hold when including them.

Next, we merge this data with information on stock prices of traded BHCs from CRSP. The Federal Reserve Bank of New York provides information on the identity of holding companies to

link their balance sheet information to price information reported by CRSP.[2] Three BHCs report two different stock prices for different classes of shares for about 13 quarters and therefore report two values of market capitalization. We sum the reported amounts of capitalization whenever two different classes of shares are traded in a quarter. Using data on stock market capitalization of a bank's equity, we compute each bank's Tobin's *q* as the ratio of stock market capitalization of equity plus book value of total liabilities, minority interest, and perpetual preferred stock divided by the book value of total assets

This procedure leads to a sample of 29,770 BHC-quarter-observations. We further exclude observations below the 1st and above the 99th percentile of *q* to mitigate the effect of outliers. Our final sample contains 28,374 BHC-quarter observations of 759 BHCs. The time period of our sample ranges from the second quarter of 1986 to the last quarter of 2007 and includes all publicly traded BHCs, headquartered in one of the 50 states of the U.S. and the District of Columbia.

Table 1 reports descriptive statistics of the main variables, with the sample of 759 BHCs split into diversified and nondiversified BHC-quarter observations. Since BHCs diversify during our sample period, the same entity can appear in both columns of table 1, being categorized as a nondiversified BHC in the quarters before it diversifies and a diversified BHC afterwards. About one quarter of our sample consists of BHCs with subsidiaries in more than one state. Also, more than half of all geographically diversified BHCs have at least five subsidiaries located in at least three different states. The majority of nondiversified BHCs, on the other hand, operate only one subsidiary.

[2] The file providing these links can be found at http://www.newyorkfed.org/research/banking research/datasets.html

As shown, diversified banks tend to (1) have higher Tobin's *q*, (2) be more profitable as measured by the return on equity, (3) be much larger, and (4) be more diverse in their activities, as measured by Income Diversity and Asset Diversity. Thus, it is important to consider BHC characteristics in assessing the relationship between geographic diversity and BHC valuation.

Panel B of Table 1 presents differences in descriptive statistics between the subsidiaries of geographically diversified and nondiversified BHCs for the sample of subsidiaries that we use to analyze bank's insider lending practices. Because banks report their lending to insiders from the first quarter of 1988 until the last quarter of 2006, the sample in panel B does not include the year 2007 (unlike the sample in panel A).

The descriptive statistics indicate that (1) about half of the sample of subsidiaries is associated with BHCs that are geographically diversified, and (2) subsidiaries of geographically diversified holding companies tend to be larger than subsidiaries of nondiversified BHCs.

In table 2, we present ordinary-least-squares (OLS) regression results where we focus on differences between diversified and nondiversified BHCs. The regressions condition on state- and quarter fixed effects. The results suggest that geographic diversification is associated with greater activity diversity. Moreover, in comparison to nondiversified BHCs, geographically diversified holding companies are also more profitable and larger.

3. Geographic diversity of BHC assets and Tobin's *q*: OLS results

3.1 Preliminary results

As a preliminary assessment of the relationship between the market valuation of a BHC and its geographic diversification, we first estimate OLS regressions. The reduced form model is specified as follows:

$$q_{ist} = \beta D_{ist} + \boldsymbol{X}'_{\mathbf{ist}}\rho + \delta_i + \delta_{st} + \varepsilon_{ist}$$

where q_{ist} denotes the Tobin's q of BHC i in state s during quarter t, D_{ist} denotes alternative measures of a BHC's geographic diversification, $\boldsymbol{X}'_{ist}$ is a matrix of conditioning information, and the δ's are fixed effects, where we use BHC, state, quarter, and state-quarter fixed effects in various specifications. Throughout the paper, the reported standard errors are heteroskedasticity robust and adjusted for clustering at the state-quarter level. The BHC fixed effects account for unobserved, time-invariant differences across BHCs, and focuses the analysis on how the valuation of a BHC changes after diversification increases. Hence, BHC fixed effects control, inter alia, for time-invariant differences in the management and corporate governance of BHCs, and the BHC's establishment date. State-quarter fixed effects, in particular, account for time-varying, state-specific traits, including economic activity, changes in fiscal, labor, tax, and other economic policies at the state level. In alternative specifications, we also consider different combinations of fixed effects, including time-varying state fixed effects for the states in which a BHC has subsidiaries.

In Table 3, we consider four measures of the cross-state diversity of BHC assets: (1) a dummy variable that takes a value of one if the BHC has bank subsidiaries in more than one state, and zero otherwise (2) the fraction of the BHC's total assets held in out of state subsidiaries, (3) one minus the Herfindahl index of the distribution of the BHC's assets across states, and (4) the

average distance (in miles) between the BHC's central office and its subsidiaries (including subsidiaries within the home state). In the first four regressions, we simply condition on state and quarter fixed effects. In the next four regressions, we also control for BHC fixed effects.

The relationship between diversification and *q* depends importantly on whether the regression excludes or includes BHC fixed effects. Without BHC fixed effects, there is a positive relationship between each of the four diversity measures and *q*. This relationship is statistically significant at the one-percent level. When conditioning on BHC fixed effects, however, there is a strong negative and statistically significant relationship between geographic diversification and BHC valuations. These results hold when using state-quarter fixed effects.

Without addressing causality, the economic magnitudes are small. For example, the estimated coefficient in column 7 indicates that if the median nondiversified BHC switched to the median level of diversity, this would be associated with a drop in *q* of about 0.4, i.e., about 0.4% since median *q* is about 100, suggesting a drop in market capitalization of the average bank of about $15 million. Aggregating for all banks, the coefficient estimates suggest a drop of bank capitalization in the neighborhood of $20 billion associated with diversification. While small, the coefficients from table 3 reflect a net result that also incorporates the positive ramifications of diversification. Furthermore reverse causality is likely to attenuate the coefficient since one might expect highly valued banks to diversify. Thus, using instruments that isolate the causal impact of diversification on valuations might yield larger effects, which is exactly what we find below.

One concern about the results in Table 3 is that there might be trends in BHC valuations that start *before* the BHC diversifies. We want to know whether there is a break in the evolution of *q* when a BHC diversifies. If values are falling before a BHC diversifies, then the regressions in

Table 3 would indicate that *q* fell after diversification, but it would not imply that that there was a break in the evolution of *q* following diversification.

Thus, we trace out the dynamics between diversification and BHC valuations to assess whether there are pre-diversification trends in *q*. Specifically, we run the following regression:

$$q_{it} = \alpha + \beta_{-10} D_{-10t} + \beta_{-9} D_{-9t} + \ldots + \beta_{10} D_{10t} + \delta_i + \delta_{st} + \varepsilon_{it}$$

where D_{-j} equals one for BHCs in the j^{th} quarter before the BHC first diversifies into another state, D_{+j} equals one for BHCs in the j^{th} quarter after the BHC first diversifies. We do this while controlling for BHC and state-quarter fixed effects. We consider a window of 20 quarters, spanning from 10 quarters before the BHC first diversifies until 10 quarters afterwards. We estimate this relationship only for BHCs that expanded geographically during the sample period. Figure 1 plots the estimated coefficients from the regression: the solid line is the estimated coefficients (β_{-10}, β_{-9} ...), while the dashed lines represent the 95% confidence interval.

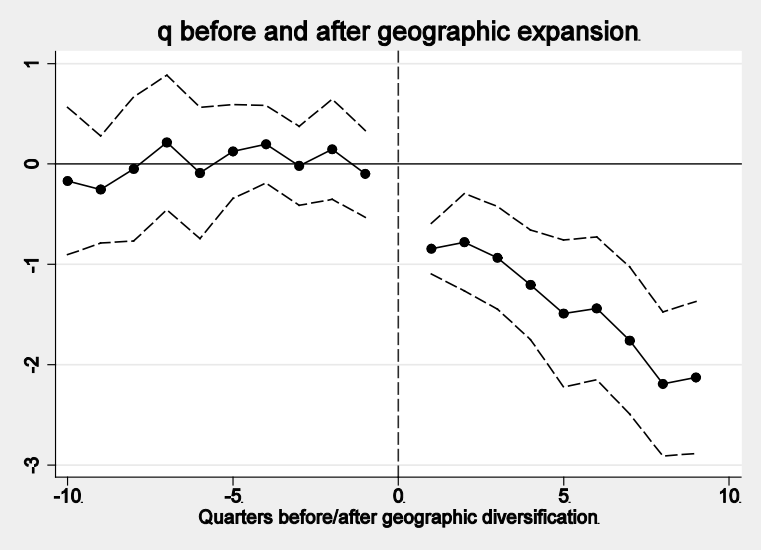

Figure 1. The Dynamic Impact of Geographic Expansion on *q*. This figure plots the impact of a geographic expansion on BHC's *q*. We consider a window of 20 quarters, spanning from 10 quarters before diversification until 10 quarters after geographic expansion. We report estimated coefficients from the following regression

$$q_{it} = \alpha + \beta_{-10} D_{-10t} + \beta_{-9} D_{-9t} + \ldots + \beta_{10} D_{10t} + \delta_i + \delta_{st} + \varepsilon_{it}$$

D_{-j} equals one for banks in the jth quarter before expansion, D_{+j} equals one for banks in the jth quarter after expansion. Our coefficients are centered on the quarter of expansion. The solid line are the estimated coefficients (β_{-10}, β_{-9} ...), the dashed lines represent the 95% confidence interval.

As shown in Figure 1, there is a marked break in BHC *q* after it first diversifies across state boundaries and the drop in *q* grows for a few quarters afterwards as well. There are no signs of a change in *q*, or trends in *q*, prior to deregulation.

3.2 Robustness tests with additional controls

In Table 4, we assess the robustness of the relationship between the cross-state diversity of BHC assets and a BHC's *q* by controlling for many additional BHC-specific and state-specific factors and by considering alternative combinations of fixed effects, including dummy variables to control for the states where a BHC has subsidiaries. The regressions in Table 4 use our broadest measure of geographic diversity, i.e., 1 – the Herfindahl index of BHC assets across states.

We find that the negative association between BHC diversity and *q* is quite robust. First, we still find a negative link between geographic diversification and *q* after we control for BHC-specific factors, including the median *q* of all BHCs in the state, the degree of market concentration in the BHC's home state, the growth of total assets and operating income, BHC profitability, the BHC's capital-asset ratio, BHC asset size and operating income, and the degree to which the BHC receives income from diverse financial activities and invests its assets in diverse activities, and after we control for time-varying, state-specific factors, such as the growth of personal income. While the diversity of BHC activities, as measured by the degree to which the BHC receives income from non-interest earning assets and invests in assets beyond loans, is negatively associated with *q*, the regression still indicates an independent, negative association between cross-state asset diversity and BHC *q*.

Second, we test whether the results are sensitive to the location of a BHC's subsidiaries. For example, two BHCs chartered in Rhode Island could each have a single subsidiary, one in Massachusetts and the other in Connecticut. Thus, in Table 4, we incorporate a set of state dummy variables for each BHC, where the value of each dummy equals one if the BHC has a subsidiary in that state and quarter, and zero if the BHC does not have a subsidiary in that state and quarter (column 4). Moreover, we allow the effect of diversifying into each particular state to vary over time (column 6). Again, we find a robust negative relation between the cross-state diversity of BHC assets and market valuations after controlling in this manner for the state-specific location of a BHC's subsidiaries.

3.3 BHC Acquisitions and Sales

The literature has raised several concerns about drawing inferences about a diversification discount from analyses of mergers and acquisitions (M&A). For example, using plant-level data from U.S. manufacturing firms, Maksimovic and Phillips (2002) find that less productive firms tend to diversify, but diversity does not cause lower productivity. Campa and Kedia (2002) find that the same characteristics that induce manufacturing firms to diversify also lower firm values. Graham, Lemmon, and Wolf (2002) argue that nonfinancial conglomerates tend to purchase already discounted target firms, which produces the diversification discount. Custodio (2010) notes that M&As typically trigger an upward revaluation of the book value of assets, which will mechanically reduce q, potentially leading to spurious inferences about the relationship between diversity and valuations. Thus, a proper examination of the impact of diversification must account for the potential complexities introduced by M&As.

The particulars of BHC diversification permit us to conduct several analyses to assess the empirical importance of these concerns in the banking industry. In our sample, changes in the diversification of BHC subsidiaries across states occur for three reasons: (1) M&As of subsidiaries in other states, (2) de novo expansion, where a BHC establishes new subsidiaries in different states, and (3) organic diversification, where a BHC with subsidiaries in different states experiences growth in those out-of-state subsidiaries. In the nonfinancial diversification literature, concerns have primarily been raised about M&As, not the other methods of diversification. Thus, we focus on the other two forms of diversification by eliminating the year after a BHC engages in any form of M&A activity. As we show, the results do not seem to be driven by changes in the accounting value of assets or other oddities around the time of M&As.

We also examine different forms of BHC transactions: Some transactions increase BHC complexity and others simplify the subsidiary structure of BHCs. For example, a BHC could establish a new subsidiary, increasing complexity. Or, a BHC can sell subsidiaries to another BHC, reducing complexity. According to the view that the complexity of BHCs is positively associated with agency problems within the BHC, simplifying transactions should increase q, while complicating transaction should reduce a BHC's q.

In Table 5, we show that the q of a BHC rises when it engages in transactions that increase the complexity of the BHC and that the q of a BHC falls when it conducts transactions that reduce its complexity. These findings are consistent with the view that complexity intensifies agency conflicts between managers and shareholders. To gauge changes in the complexity of BHCs, we consider changes resulting from the acquisition or sale of bank subsidiaries. To see whether an acquisition or a sale of a bank subsidiary affects BHC q, we include a dummy variable that equals one if a BHC buys another subsidiary in quarter t, and zero otherwise (Acquisition Dummy).

Similarly, we construct a dummy variable that equals one if a BHC sells a subsidiary in quarter *t*, and zero otherwise (Sale Dummy). Table 5 shows that a BHC purchase of a subsidiary is associated with a decrease in *q* whereas a sale is associated with an increase in *q*, consistent with the agency conflict view of BHC complexity. Also, note that BHC diversification, as measured by 1 – Herfindahl Index of BHC assets across states, always enters negative and significantly in Table 5. Thus, across these different samples and after conditioning for different BHC transactions, we continue to find that a larger degree of BHC diversification is associated with lower *q*.

Furthermore, when we eliminate observations on BHCs during the year after they engage in M&A activity and thereby focus on (1) changes in geographic diversity from de novo expansions and (2) changes in geographic diversity from organic changes in BHC assets across states, the results hold. This reduces, though does not eliminate, concerns that oddities associated with M&A activity drive our findings. By examining the relationship between diversification and changes in insider loans below, we further reduce concerns that the results only reflect accounting and other mechanical alterations associated with M&As.

The results presented thus far, however, do not permit a causal interpretation. The OLS estimates could be biased because BHC valuations could affect the decision of BHCs to expand geographically and because some third factor, such as time-varying differences in BHC management, could drive both diversification and *q*.

4. Instrumental variables: State-Time Instruments

To obtain a consistent estimate of the impact of the geographic diversity of BHC assets on *q*, we need an instrumental variable that is correlated with the cross-state diversity of BHC assets but not independently correlated with *q* through other channels. As emphasized in the Introduction, we employ two instrumental variable strategies. Our first strategy employs time-varying, state-level instruments. After describing these instruments and presenting the results in this section, the next section develops an instrumental variable strategy to indentify diversity at the time-varying, BHC-level.

4.1 The time-varying, state-level instruments

We use the state-specific process of interstate bank deregulation to identify exogenous increases in the cross-state diversity of BHC assets. The idea is that as one state, say Massachusetts, signed bilateral and multilateral reciprocal interstate banking agreements with other states over the years, and as other states made unilateral decisions allowing the entry of BHC subsidiaries from Massachusetts, Massachusetts BHCs had greater and greater opportunities to open subsidiaries in other states. As emphasized, there are enormous cross-state differences in the *evolution* of interstate bank deregulation.

We experimented with several time-varying, state-level instruments. The first three instruments do not explicitly account for the state-specific evolution of bank deregulation. First, we simply use the number of years since a state first started liberalizing its interstate restrictions (Years since interstate bank deregulation), thereby allowing BHCs from other states to enter. Second, we use this variable, Years since interstate bank deregulation, and its square to allow for a quadratic relationship between interstate deregulation and the cross-state diversification of BHC

assets. Third, we consider a nonparametric specification that includes independent dummy variables for each year since the state started liberalizing interstate restrictions, taking a value of one all the way through the first ten years after regulation, and zero otherwise.

The remaining six specifications of the first-stage regression explicitly account for state-specific differences in the evolution of interstate banking deregulation across states.

The fourth first-stage regression includes the logarithm of the number of states in which a BHC can open subsidiaries, including its home state. This is a simple measure of the number of states in which a BHC can potentially operate, and we refer to this variable as Ln (Number of accessible states).

Fifth, we weight the number of accessible states by the inverse of their distance from the home state, since it might be less costly for a bank in California to open a subsidiary in, say, Nevada than in, say, New Hampshire. We give the closest state a weight of one and the farthest state a weight of zero:

$$w_{ij} = \left(\frac{d_f - d_{ij}}{d_f} \right) \frac{d_f}{d_f - d_c},$$

where d_{ij} is the distance between home state i and state j, and d_f (d_c) is the distance between the home state and the farthest (closest) state. Hence, all states receive a weight between zero and one, whereas the weight depends on the relative distance of that state to the farthest state. We refer to this variable as Ln (Number of accessible states – weighted).

For the sixth and seventh instruments, we use a measure of the potential interstate market available to BHCs by including the natural logarithm of the total population of the states in which the BHC could potentially operate, excluding the BHC's home state. We refer to this variable as Ln (Market Population). Thus, rather than simply counting the number of accessible states, as done in

Ln (Number of accessible states), Ln (Market Population) also captures information on the potential market available to the BHC from the opening of subsidiaries elsewhere. For the seventh instrument, we weight the sixth measure of the potential population available to BHCs by the relative distance of the market from the BHCs home state, and refer to this variable as Ln(Market Population – Weighted). This variable is the weighted version of Ln (Market Population), where we use the aforementioned weighting scheme.

Finally, the eighth and ninth instruments are based on Market Potential, which equals Market Population divided by the population of BHC's home state. This variable captures the possibility that the desirability of opening a subsidiary in another state is positively associated with the additional market made available by that state. Thus, a BHC in California and a BHC in Nevada might view the appeal of opening a subsidiary in, say, Oregon differently. The ninth instrument uses the weighted version of this instrument. That is, we weight each component of Market Potential, i.e., each available state's population, by the state's relative distance from the BHC's home state, and refer to this weighted market potential index as Market Potential – Weighted. As we show below, these instruments explain the time-series pattern of BHC diversification, but seem to be uncorrelated with bank valuations (and insider lending) beyond their effect on BHC diversification.

4.2 First-stage regression results with time-varying, state-level instruments

The first-stage regression results are presented in Panel B of Table 6. As shown in columns one through nine, we find that interstate deregulation increased the degree of cross-state diversity of BHC assets. The positive impact of deregulation on BHC diversity holds across the different indicators of interstate bank deregulation. When considering the time-varying evolution of interstate restrictions (column (4) to (9)), we find the link between diversification and deregulation to be statistically weakest when focusing only on the number of states in which a BHC can potentially open a subsidiary. The explanatory power of our measure of deregulation in explaining BHC diversification increases when we also incorporate the size and distance of potential markets into our instrument. The significant impact of deregulation on BHC diversity holds when conditioning on a full set of BHC-specific, and state-specific factors as well as state and quarter fixed effects. Since the treatment is occurring at the state-time level, we do not employ BHC fixed effects in these first set of instrumental variable results. We do include BHC fixed effects later when we develop a BHC-level treatment.

The associated *F*- statistics support the use of our instruments. The *F*-test results show that interstate deregulation explains BHC diversity after controlling for many potential influences. There is a strong statistical link between deregulation and BHC diversity. Hansen J-test results (not reported) indicate that we cannot reject the null hypothesis that our model is over-identified. Thus, the first-stage regressions provide a sound basis for using interstate bank deregulation to identify the impact of BHC diversity on q.

The first-stage of our examination is both novel and crucial for assessing the agency problems of complex financial institutions. In terms of novelty, we are unaware of other research that exploits the state-specific, time-series process of interstate deregulation. Although

researchers have examined interstate bank deregulation in a variety of settings, they treat deregulation as a single event. States are classified as either restricting interstate banking or not, where this binary demarcation is dated on the year in which a state first allows a BHC from another state to enter and establish a subsidiary. But, in fact, interstate deregulation was a multi-year process. Thus, we examine each state's unique timing and process of deregulation. In terms of identification, exploiting cross-state differences in the process of deregulation allows us to identify the exogenous evolution of BHC diversity. This is crucial for drawing precise inferences about the impact of geographic diversity on BHC *q* and insider lending behavior.

4.3 Second-stage regression results with time-varying, state-level instruments

Panel A of Table 6 presents the second-stage results of our two-stage least squares (2SLS) regressions of the relationship between the market valuation of BHCs and the degree of BHC diversity, using interstate bank deregulation as an instrument for BHC diversity. The table provides the second-stage results for the nine different sets of instrumental variables. As already mentioned, the associated first-stage results are reported in Panel B of Table 6.

The second-stage results indicate that the cross-state diversity of BHC assets lowers *q*. In particular, the projected value of BHC asset diversification is associated with a significant reduction in BHC *q*. The only exception is when using the instrumental variable Ln (Number of accessible states). As noted, this is also the only instrumental variable that has weak explanatory power in explaining the cross-state diversity of BHC assets in the first-stage regressions. However, when we weight by the size of the accessible states or the distance of the accessible states from the BHC, this (1) improves the fit of the first-stage regression and (2) yields a second-stage result

in which the exogenous component of BHC diversity is negatively, and statistically significantly, linked to BHC *q*.

The economic size of the estimated impact of cross-state asset diversity on market valuation of a BHC is large. For example, a one standard deviation increase in the asset diversity index (1 – Herfindahl Index of assets across states) implies a decrease in *q* of about 30 percent of its standard deviation when using regressions (4) or (5), a reduction of over 40 percent of its standard deviation when using regressions (6) or (7), and a reduction of about 12 percent of its standard deviation when using the other regressions. As another example, consider New Jersey and the regression estimates in regression (7) of Table (6). The results suggest that if New Jersey were to change from a situation in which its banks were prohibited from diversifying into any state to a situation in which all states allowed New Jersey banks to enter that the average *q* of banks in New Jersey would fall by almost 5 percent. This is substantial. Aggregating across the U.S. banking system, it would involve a drop in market capitalization of about $225 billion.

In terms of comparing the sizes of the OLS and 2SLS coefficient estimates for cross-state asset diversity, the 2SLS estimates are between 10 and 20 times as large as the OLS estimates in absolute value terms. One explanation for this result is that higher-valued BHCs might be more likely to diversify than lower-valued BHCs, even though an exogenous increase in diversity lowers *q*. As such, the OLS estimate would be biased toward zero and away from the true impact of BHC diversity on *q*.

4.4 *Geographic diversity of BHC assets and insider lending*

Next, we examine the impact of the cross-state diversity of BHC assets on the degree and nature of insider lending. By extending the analyses to insider lending, we provide direct evidence on the potential extraction of private rents by corporate insiders due to the increasing complexity of BHCs. If there are private benefits from controlling complex BHCs, then increases in complexity from greater cross-state asset diversification should boost the frequency and generosity of bank loans to its executive officers.[3]

Methodologically, we use the same approach as used before in our assessment of market valuations, with one exception. Because information on lending to executive officers is collected only at the subsidiary level, we examine whether subsidiaries of geographically diversified BHCs provide more frequent and generous loans to their executive officers. Therefore, we compare the insider lending activity of subsidiaries that are located in the same state, but differ with respect to the level of geographic diversification of their parent BHCs. To capture differences among subsidiaries in the same BHC, we control for the share of a subsidiary's assets in a BHC's total assets. We first present the results using deregulation as instrument, and then we also differentiate by BHC closeness to other states.

Table 7 provides the instrumental variable regression results for the two different measures of insider lending: (1) a zero-one indicator of whether the subsidiary granted a loan to a bank executive in that quarter, and (2) a measure of the average size of insider loans. Since the

[3] Our work relates to recent research by Grinstein and Palvia (2010), who examine insider lending by banks. They show that bank's with weaker governance characteristics tend to engage in greater insider lending. While they focus on measures of governance characteristics, we examine whether the greater complexity associated with geographic diversification boosts insider lending. Furthermore, we use the richness of cross-state differences in the process of interstate bank deregulation to identify an exogenous change in geographic diversity, which allows us to assess the impact of complexity on the private benefits of controlling BHCs.

first-stage regression results are essentially the same as those reported in Table 6, we simply summarize the second-stage results in Table 7. The results suggest that increases in the cross-state diversity of BHC assets due to interstate bank deregulation (1) boost the likelihood that the BHC's subsidiaries will grant a loan to its executive officers and (2) enhance the size of such insider loans. First, Panel A shows that subsidiaries of geographically diversified BHCs are more likely to extend credit to an executive officer. Because Lending Indicator is a dummy variable, we can interpret the coefficients as changes in the probability of extending credit. Using the coefficient in regression 6, for instance, we find that a one standard deviation increase in a holding company's level of diversification increases the probability of granting a loan to an executive officer by 15 percentage points. This is a large effect given the standard deviation of the fraction of bank subsidiaries that have extended insider loans of about 44 percent.

Second, we also find that geographically diversified subsidiaries make significantly larger loans to executive officers than subsidiaries of undiversified BHCs (Table 7 – Panel B). The economic effect of this loan size result is substantial. Using the regression coefficients in regression 6, we calculate that a one standard deviation increase in a holding company's dispersion of assets across states is associated with an increase in the average loan size of approximately 36% of its standard deviation. Since we condition on a bank's (and BHC's) log of total assets in the analysis, this effect cannot be due to its size.

5. Instrumental Variables: Gravity-Deregulation Model

Next, we differentiate the impact of the process of deregulation on BHCs within the same state. Specifically, we differentiate the impact of deregulation on the likelihood that each BHC diversifies into *each* state in each period that it is legally feasible for the BHC to diversify into that particular state. We compare BHCs within a state and identify them by their differential distances from other states. Thus, we exploit both the bilateral, dynamic nature of deregulation and the exogenous factors influencing each BHC's "foreign" direct investment decision.

5.1. Gravity-deregulation model: Strategy

We use a gravity model to construct a time-varying, BHC-specific instrumental variable for diversification, which we then use in our two-stage least squares evaluation of the impact of diversity on *q* and insider lending. Frankel and Romer (1999) developed this approach to study whether international trade causes economic growth, and Rubinstein (2011) critiques and improves this approach. They first use a gravity model of international trade to estimate bilateral trade volumes between all country pairs. Based on the projected bilateral trade volumes emerging from their gravity model, they project trade flows and aggregate and construct the projected trade volume of each country. Using this projected trade share as their instrument for actual trade in their first stage regression, they assess the causal impact of trade on growth.

Motivated by empirical gravity models of international trade, we hypothesize that BHCs will invest more in geographically close states than in far states. BHCs – and their clients – that are close to another state might have greater familiarity with its economic conditions and face lower costs to establishing and maintaining subsidiaries in closer states. Put differently, a BHC in the southern part of California tends to invest more in Arizona than Oregon and a BHC in the northern

part California might find it correspondingly more appealing to open a subsidiary in Oregon. To measure closeness to other states, we compute the distance (in 100s of miles) of the county of each BHC's headquarters to each other state's capital, which we call "Distance in 100 miles." Since we are focusing on interstate diversification, we assume that the distance to the capital of a BHC's home state is equal to zero. We further hypothesize that BHC will be more attracted to comparatively larger markets than smaller markets. Thus, holding other things constant, BHCs in Colorado will invest more in California than in Wyoming. To measure relative market size, we compute the logarithm of the population of the BHC's home state (in period t) divided by the population of a foreign state (in period t): Ln(Population-ratio).

5.2. The Gravity-Deregulation Model: Two-Step Process

In the first step of the gravity-deregulation model, we estimate the following gravity model:

$$Share_{b,i,j,t} = a*Distance_{b,i,j} + b*Ln(pop_{i,t}/pop_{j,t}) + \delta_b + \delta_i + \delta_j\ (+\delta_{i,j}) + \delta_t + \varepsilon_{b,i,j,t}\ .$$

$Share_{b,i,j,t}$ is the percentage of assets of BHC *b*, headquartered in state *i*, held in its subsidiaries in state *j* in quarter *t*. $Distance_{b,i,j}$ is the distance in 100s of miles between the county of BHC *b*'s headquarters and state *j*'s capital. $Ln(pop_{i,t}/pop_{j,t})$ is the Ln(Population-ratio) defined above. We control for BHC fixed effects and either fixed effects for each state, or fixed effects for each state-pair ($\delta_b + \delta_i + \delta_j\ (+\delta_{i,j}) + \delta_t$). In this first step, we only include observations in which it is legally feasible for BHC *b* with headquarters in state *i* to open a subsidiary in state *j* during quarter *t*.

Table 8 presents the results from this gravity regression. Regression 1 includes fixed effects for each bilateral state as well as quarter fixed effects. Regression 2 includes fixed effects for each

pair of states. Regressions 3 and 4 are the same as regressions 1 and 2 except BHC fixed effects are included.

Two crucial points emerge from Table 8. First, our gravity model works reasonably in explaining BHC investment in foreign states. For example, regressions (1) and (3) indicate a negative relationship between BHC investment in a state and (a) distance of the BHC to the state and (b) how small the state is relative to the BHC's home state. Thus, the model predicts that for each 100 miles a foreign state is away from a BHC, the percentage of assets the BHC hold in that state will fall by about 1.7 percent, conditioning state, quarter, and BHC fixed effects.

Second, distance matters even when conditioning on state-pair fixed effects. This means that differences among BHCs within the *same* state matter in explaining investment in a different state. It is not simply the distance between the states that matters. Differences in distance to state *X* among BHCs headquartered in state *Y* help explain differences in how much the BHCs invest in state *X*. That is, BHCs in southern California have a different tendency to hold assets in Arizona than BHCs headquartered in northern California.

In this first step of the gravity-deregulation model, we tried several variations. Many BHCs do not diversify. Thus, the dependent variable has many zeros. When we estimate a Tobit, the results reported below become much stronger. The data are also censored at one hundred: a BHC cannot have more than 100 percent of its assets in a different state. Thus, other estimate strategies could be employed. We report the results with least squares because they are straightforward, and provide the weakest results. Furthermore, there might be nonlinearities in the gravity relationship and there might be interactions between distance and population shares. When incorporating these possibilities, it did not affect the results, so we simply report the results based a simple, linear least squares gravity-regulation model.

In the second step of the gravity-deregulation model, we construct a projected diversity measure for each BHC in each quarter. For observations in which a BHC is legally permitted to open a subsidiary in a particular state, we use the projection share from the estimated gravity model given in Table 8. For observations in which regulations prohibit a BHC from opening a subsidiary in a state, we set the projected share equal to zero. Then, we use these projected shares to compute the diversity index—the projected Herfindahl index of each BHC assets across states. Thus, we use the gravity-deregulation model to construct 1- Herfindahl Index of assets across states (Predicted). We use this predicted diversity index from the gravity-deregulation model as the instrument for actual diversity in our first stage regression to assess the impact of diversity on *q* and insider lending.

5.3 Results using BHC instruments based on the gravity-deregulation model

As shown in Table 9, the first-stage results suggest that the instrumental variable, 1-Herfindahl Index of assets across states (Predicted), is very useful in explaining BHC diversity. The F-test of the excluded instruments is above ten. In this table, we use regression (2) of Table 8, but the results hold for any of the gravity models provided in Table 8.

The second-stage results indicate that geographic diversity reduces Tobin's *q* and increases insider lending. By using time-varying, BHC-specific instrumental variables, this gravity-deregulation strategy identifies the impact of each BHC's diversity on its *q* and insider lending decisions, so we can condition on BHC fixed effects as well as state-time fixed effects throughout.

These BHC-level instrumental variable results (Table 9) have a particularly valuable property relative to the results based on state-level instruments (Tables 6). Although we control for state-quarter characteristics in the early analyses, including the time-varying level of

competition within each state, the state-time level instrumental variable results provide information on the "average" BHC in state, and what happens to its *q* and insider lending. But, the "average" BHC does not diversify. We want to indentify the impact of diversity on valuations and insider lending at the BHC-level. The BHC-level instrumental variable results indicate that it is the act of a BHC diversifying that reduces valuations and increases insider lending.

Economically, the BHC-level instrumental variable results—based on the gravity-deregulation model—are similar in magnitude to the results based on state-level instruments. Regulatory induced changes in diversity that affect BHCs differently depending on their location have large economic effects on valuations, reducing Tobin's *q* by 4 percent when a state goes from completely closed to completely open. The results on insider lending are similarly strong. The results reaffirm that increases in geographic diversity increased the degree of insider lending, boosting both the probability of those loans and the size of loans to bank executives.

The results are consistent with the following view. First, the process of interstate bank deregulation that started in 1978 increased the cross-state asset diversity of some BHCs. Second, this increased diversity boosted the complexity of BHCs and intensified agency problems, making it more difficult for small shareholders and creditors to monitor corporate insiders. Third, under these conditions, insiders were able to extract larger private benefits from controlling these financial institutions. Lower market valuations and more generous insider lending represent two manifestations of the increase in BHC diversity triggered by interstate bank deregulation.

6. Conclusions

This paper examines two narrowly defined questions: How does an exogenous increase in the geographic diversity of a BHC asset affect (1) the market's valuation of the BHC and (2) the degree and generosity of a BHC's insider loans to bank executives? We use the state-specific, time-series pattern of interstate bank deregulations to identify the exogenous component of the geographic diversity of BHC assets and we use a gravity model BHC investment across states to differentiate among BHCs within the same state. This allows us to draw more precise inferences about the causal impact of geographic diversity on BHC *q* and insider lending than previous research.

We find that the increases in geographic diversity due to interstate bank deregulation reduced BHC valuations and increased the frequency and size of insider loans. The results are robust to (1) using different specifications of the first-stage regression that estimates a BHC's propensity to diversify geographically, (2) to conditioning on numerous state-, time-, and BHC-specific characteristics, and (3) to examining various sub-samples of the data that mitigate concerns that mergers and acquisitions or outliers confound the results.

These results can be interpreted more broadly than simply providing information about the increased complexity of monitoring geographically diverse BHCs. Moreover, the results suggest that an exogenous increase in the complexity of financial institutions – by making it more difficult for outside investors to exert effective corporate control over financial conglomerates – makes it easier for corporate insiders to extract larger private rents with adverse implications for the performance and behavior of financial conglomerates.

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Table A1: Evolution of Reciprocal Branching Agreements - The case of MA and NY

	MA	NY
1981		
1982		AK, ME, NY
1983	CT, ME	AK, ME, NY
1984	CT, ME, RI	AK, ME, NY
1985	CT, ME, RI	AK, ME, NY
1986	CT, ME, RI	AK, AZ, KY, ME, NY
1987	CT, ME, NH, RI	AK, AZ, KY, ME, NY, OK, TX, UT, WA, WY
1988	CT, ME, NH, RI, VT	AK, AZ, ID, KY, ME, MI, NJ, NY, OH, OK, RI, SD, TX, UT, WA, WV, WY
1989	CT, ME, NH, RI, VT	AK, AZ, ID, KY, LA, ME, MI, NV, NJ, NM, NY, OH, OK, OR, RI, SD, TX, UT, WA, WV, WY
1990	AK, AZ, CT, DE, ID, IL, KY, LA, ME, MA, MI, NV, NH, NJ, NM, NY, OH, OK, OR, PA, RI, SD, TX, UT, VT, WA, WV, WY	AK, AZ, CT, DE, ID, IL, KY, LA, ME, MA, MI, NV, NH, NJ, NM, NY, OH, OK, OR, PA, RI, SD, TX, UT, VT, WA, WV, WY
1991	AK, AZ, CA, CO, CT, DE, ID, IL, KY, LA, ME, MA, MI, NE, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, WA, WV, WY	AK, AZ, CA, CO, CT, DE, ID, IL, KY, LA, ME, MA, MI, NE, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, WA, WV, WY
1992	AK, AZ, CA, CO, CT, DE, ID, IL, IN, KY, LA, ME, MA, MI, NE, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, WA, WV, WY	AK, AZ, CA, CO, CT, DE, ID, IL, IN, KY, LA, ME, MA, MI, NE, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, WA, WV, WY
1993	AK, AZ, CA, CO, CT, DE, ID, IL, IN, KY, LA, ME, MA, MI, NE, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, WA, WV, WY	AK, AZ, CA, CO, CT, DE, ID, IL, IN, KY, LA, ME, MA, MI, NE, NV, NH, NJ, NM, NY, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, WA, WV, WY
1994	AK, AZ, CA, CO, CT, DE, ID, IL, IN, KY, LA, ME, MA, MI, MN, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, VA, WA, WV	AK, AZ, CA, CO, CT, DE, ID, IL, IN, KY, LA, ME, MA, MI, MN, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, VA, WA, WV
1995	ALL	ALL

Table 1: Summary Statistics

	Undiversified Bank Holding Companies						Diversified Bank Holding Companies					
	N	Mean	Std.Dev.	Min.	Max.	Median	N	Mean	Std.Dev.	Min.	Max.	Median
PANEL A:												
LEVEL: BANK HOLDING COMPANY												
Tobin's Q	21,659	105.757	5.702	94.912	130.716	104.858	6,715	106.155	6.164	94.997	130.748	104.785
Fraction of assets held by out-of-state-banks	21,301	0	0	0	0	0	5,329	.181	.155	0	.901	.135
1 - Herfindahl Index of assets across states	21,301	0	0	0	0	0	5,328	.434	.260	0	1	.408
Number of states	21,659	1	0	1	1	1	6,715	3.272	1.931	2	14	3
Number of subsidiaries	21,659	2.009	2.609	1	38	1	6,715	8.674	9.549	2	73	5
Income Diversity	21,095	0.634	0.120	.024	1	.630	6,653	.740	.124	.065	1	.736
Asset Diversity	21,528	0.770	0.168	0	1	.798	6,610	.802	.149	0	1	.835
Equity (in 1,000,000 $)	21,659	194.313	636.763	1.719	1.86e+10	66.884	6,715	3200.060	1.14e+10	11.626	1.47e+11	587.472
Total Assets (in 1,000,000 $)	21,659	2277.381	6882.880	77.276	1.86e+11	782.070	6,715	4.25e+10	1.50e+11	150.621	2.36e+12	7304.913
Net Interest Income (in 1,000,000 $)	21,104	20.788	55.293	-77.538	1195.284	7.784	6,654	306.783	965.156	-1.573	1.29e+10	65.933
Total Operating income (in 1,000,000 $)	21,104	47.201	149.357	1.693	3977.554	15.843	6,654	932.426	3070.990	-685.444	4.57e+10	159.902
Return on Equity	20,729	2.995	1.586	-9.737	6.820	3.177	6,540	3.309	1.580	-9.554	6.806	3.533
Average Distance between HQ and subsidiaries	21,577	5.342	12.713	0	893.210	0	6,715	92.906	137.287	0	967.840	45.857
Capital-Asset-Ratio	21,659	8.692	2.313	.484	40.867	8.44	6,715	8	1.842	3.014	17.756	7.911
Growth of Total Assets	20,628	.026	.0479	-.088	.338	.018	6,522	.028	.052	-.085	.338	.018
Growth of Total Operating Income	20,081	.023	.071	-.306	.462	.020	6,412	.024	.078	-.303	.463	.0201
PANEL B												
LEVEL: SUBSIDIARY												
=1 if lending to executive officer	31,077	0.306	0.461	0	1	0	37,316	0.222	0.416	0	1	0
ln(Loans per executive officer)	30,700	3.026	4.716	0	13.068	0	37,010	2.135	4.13	0	13.068	0
Share of subsidiary assets in total bank holding company assets	31,077	54.589	41.577	0.004	100	50.79	37,316	9.308	17.929	0	99.992	2.911
Return on Equity	30,762	0.838	2.254	-17.328	11.966	0.301	36,745	0.832	2.605	-17.228	11.969	0.317
Capital-Asset-Ratio	30,857	8.931	2.493	3.714	40.399	8.432	36,538	9.276	3.788	3.726	40.794	8.271
Total Assets (in 1,000,000 $)	31,077	760.329	1875.698	1.205	4.34E+10	293.11	37,316	866.421	2685.554	0.189	9.33E+10	213.061

This table shows summary statistics for the used samples. Banks are 'nondiversified' if they have subsidiaries in only one state. 'Diversified' banks have subsidiaries in at least two states. Panel A shows summary statistics for the sample of bank holding companies. The sample ranges from the second quarter of 1986 to the last quarter of 2007. Panel B shows summary statistics for the sample of subsidiary banks of holding companies from the first quarter of 1988 to the last quarter of 2006.

Table 2: Differences between Diversified and Undiversified Bank Holding Companies

	(1)	(2)	(3)	(4)
Dependent Variable	Income Diversity	Asset Diversity	Return on Equity	ln(Total Assets)
Diversification Dummy	0.093***	0.016***	0.334***	2.390***
	(0.003)	(0.002)	(0.026)	(0.036)
State-quarter fixed effects	✓	✓	✓	✓
Observations	28,512	28,732	27,983	29,768

This table reports regression results from a state-quarter fixed effects OLS analysis. The dependent variable is given in the second row. Diversification dummy is a dummy variable that takes on the value of one if a bank holding company has subsidiaries in other states, and zero otherwise. Income diversity is given as 1 - |(Net Interest Income - Total Noninterest Income)/(Total Operating Income) |, Asset diversity is defined as 1 - |(Net Loans - Other Earning Assets)/(Total Earning Assets) |.
State-specific time dummies for each quarter are used. Standard errors are robust, clustered at the state-quarter level and reported in parentheses below. Significance stars are: * p<0.10, ** p<0.05, *** p<0.01.

Table 3: Geographic Diversification and Bank Holding Company Value

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Diversification Dummy	1.159***				-0.269***			
	(0.071)				(0.097)			
Fraction of assets held by out-of-state-banks		2.420***				-1.689***		
		(0.290)				(0.380)		
1 - Herfindahl Index of assets across states			1.148***				-0.908***	
			(0.131)				(0.179)	
ln(Average distance between HQ and subsidiaries)				0.282***				-0.091***
				(0.020)				(0.027)
Quarter fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓				
Bank Holding Company fixed effects					✓	✓	✓	✓
Observations	28,374	26,630	26,629	28,292	28,374	26,630	26,629	28,292

This table reports regression results from a state-quarter fixed effects OLS analysis. The dependent variable is Tobin's *q* and given as (Capitalization + Perpetual Preferred Stock + Total Liabilities and Minority Interest)/(Total Assets). For expositional purposes Tobin's *q* is multiplied by 100. 'Diversification dummy' is a dummy variable that takes on the value of one if a bank holding company has subsidiaries in another state, and zero otherwise. 'Fraction of assets held in out of state subsidiaries' is the fraction of assets that are in affiliated subsidiaries of a holding company that are not located in the same state as the bank holding company. '1-Herfindahl index of assets across states' is 1 - the sum of squared share of assets held in different states. 'ln(Average Distance between HQ and subsidiaries)' is the log of the average distance in miles between a bank holding company headquarter's county and the county of its affiliated subsidiary banks.
State/ Bank Holding Company fixed effects and time dummies for each quarter are used. Standard errors are robust, clustered at the state-quarter level and reported in parentheses below. Significance stars are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Geographic Diversification and Bank Holding Company Value - Controls

	(1)	(2)	(3)	(4)	(5)	(6)
1 - Herfindahl Index of assets across states	-1.340***	-1.072***	-0.583***	-1.261***	-0.609***	-2.475***
	(0.134)	(0.133)	(0.153)	(0.220)	(0.199)	(0.338)
Median *q* in state and quarter	-1.556***	-1.049***	-0.165	0.653***		
	(0.299)	(0.313)	(0.374)	(0.012)		
Market Concentration (HHI)	0.832***	0.621***	0.657***	-0.112		
	(0.010)	(0.011)	(0.012)	(0.379)		
Growth of Total Assets		4.218***	3.168***	3.155***	2.983***	-0.169
		(0.647)	(0.503)	(0.501)	(0.599)	(0.627)
Return on Equity		0.977***	0.412***	0.402***	0.434***	0.514***
		(0.035)	(0.021)	(0.021)	(0.026)	(0.029)
Capital-Asset-Ratio		0.277***	-0.020	-0.030	-0.010	0.072***
		(0.021)	(0.019)	(0.020)	(0.023)	(0.025)
Growth of Total Operating Income		-4.654***	-3.532***	-3.634***	-3.983***	-1.083**
		(0.465)	(0.346)	(0.346)	(0.425)	(0.439)
ln(Total Operating Income)		6.015***	6.436***	6.528***	6.910***	1.063***
		(0.328)	(0.363)	(0.365)	(0.453)	(0.391)
Income Diversity		-5.758***	-5.393***	-5.382***	-5.468***	-5.314***
		(0.332)	(0.388)	(0.392)	(0.475)	(0.487)
Asset Diversity		-0.940***	-0.545***	-0.452**	-0.426*	-0.849***
		(0.193)	(0.187)	(0.189)	(0.228)	(0.235)
ln(Total Assets)	0.899***	-5.101***	-6.453***	-6.552***	-7.111***	-0.215
	(0.034)	(0.327)	(0.373)	(0.378)	(0.466)	(0.376)
Growth of State Personal Income	3.380	-2.465	2.441	2.343		
	(2.441)	(2.763)	(2.518)	(2.529)		
Growth of State Personal Income (lag)	5.498**	-4.092	3.680	3.803		
	(2.393)	(2.847)	(2.559)	(2.539)		
State fixed effects	✓	✓	✓			
Subsidiary state fixed effects				✓		
Quarter fixed effects	✓	✓	✓	✓		
Bank Holding Company fixed effects			✓	✓	✓	✓
State-quarter fixed effects					✓	
Subsidiary state quarter fixed effects						✓
Observations	26,629	23,944	23,944	23,944	23,944	23,944

This table reports regression results from a fixed effects OLS analysis. The dependent variable is Tobin's *q* and given as (Capitalization + Perpetual Preferred Stock + Total Liabilities and Minority Interest)/(Total Assets). For expositional purposes Tobin's *q* is multiplied by 100. '1-Herfindahl index of assets across states' is 1 - the sum of squared share of assets held in different states by the parent bank holding company. 'Median *q* in state and quarter' is the median value of Tobin's *q* in a state in that quarter. 'Market Concentration (HHI)' is a Herfindahl Index of banking asset concentration in a holding company's market. 'Income Diversity' is given as 1 - |(Net Interest Income - Total Noninterest Income)/(Total Operating Income)|, 'Asset Diversity' is defined as 1 - |(Net Loans - Other Earning Assets)/(Total Earning Assets) |. 'Capital-Asset-Ratio' is the fraction of bank equity over total assets, 'Return on Equity' is defined as Net income / Equity.
The used fixed effects model is indicated in the table: 'State fixed effects' account for the location of the holding company headquarter by including dummy variables, that take on the value of one if a holding company is headquartered in that state, and zero otherwise. The regression models labeled 'Subsidiary-state fixed effects' include a set of dummy variables that take on the value of one for each state a bank holding company has subsidiaries in. Standard errors are robust, clustered at the state-quarter level and reported in parentheses below. Significance stars are: * p < 0.10, ** p < 0.05, *** p < 0.01.

Table 5: Geographic Diversification and Bank Holding Company Value - Subsamples

	(1)	(2)	(3)	(4)
Sample Selection:	Full sample - no exclusion	If a bank holding company acquires or sells a subsidiary in a quarter, exclude observation of...		
		… that quarter	… up to two quarters after acquisition/ sale.	… up to four quarters after acquisition/ sale.
1 - Herfindahl Index of assets across states	-1.170***	-0.962***	-0.934***	-0.704***
	(0.181)	(0.212)	(0.236)	(0.268)
Acquisition Dummy	-0.166**			
	(0.073)			
Sale Dummy	0.644***			
	(0.111)			
Market Concentration (HHI)	-3.962***	-4.241***	-4.351***	-4.678***
	(0.577)	(0.588)	(0.608)	(0.635)
Growth of Total Assets	4.399***	5.233***	5.155***	5.020***
	(0.568)	(0.642)	(0.670)	(0.703)
Return on Equity	0.539***	0.553***	0.559***	0.548***
	(0.024)	(0.026)	(0.026)	(0.028)
Capital-Asset-Ratio	0.039*	0.029	0.034	0.048*
	(0.021)	(0.022)	(0.023)	(0.025)
Growth of Total Operating Income	-3.653***	-3.486***	-3.823***	-3.969***
	(0.384)	(0.424)	(0.469)	(0.489)
ln(Total Operating Income)	7.304***	7.095***	6.959***	6.826***
	(0.402)	(0.432)	(0.445)	(0.457)
Income Diversity	-7.508***	-7.319***	-7.114***	-6.622***
	(0.419)	(0.439)	(0.450)	(0.467)
Asset Diversity	-0.687***	-0.754***	-0.576***	-0.491**
	(0.203)	(0.217)	(0.221)	(0.232)
ln(Total Assets)	-7.141***	-6.975***	-6.794***	-6.608***
	(0.412)	(0.444)	(0.463)	(0.478)
Quarter fixed effects	✓	✓	✓	✓
Bank Holding Company fixed effects	✓	✓	✓	✓
Observations	23,944	20,762	19,158	16,767

This table reports regression results from a state-quarter fixed effects OLS analysis using different subsamples.
Observations are dropped according to the row labeled 'Sample Selection'. The dependent variable is Tobin's *q* and given as (Capitalization + Perpetual Preferred Stock + Total Liabilities and Minority Interest)/(Total Assets). For expositional purposes Tobin's *q* is multiplied by 100. '1-Herfindahl index of assets across states' is 1 - the sum of squared share of assets held in different states by the parent bank holding company. 'Acquisition/ Sale Dummy' is a dummy variable that takes on the value of one if the bank holding company acquires/ sells another bank, and zero otherwise. 'Consolidation Dummy' is a dummy variable that takes on the value of one if a bank of a bank holding company buys/ sells another bank that is already part of the bank holding company, and zero otherwise. 'Market Concentration (HHI)' is a Herfindahl Index of banking asset concentration in a holding company's market. 'Income Diversity' is given as 1 - |(Net Interest Income - Total Noninterest Income)/(Total Operating Income)|, 'Asset Diversity' is defined as 1 - |(Net Loans - Other Earning Assets)/(Total Earning Assets) |. 'Capital-Asset-Ratio' is the fraction of bank equity over total assets, 'Return on Equity' is defined as Net income / Equity.
State-time dummies for each quarter are used. Standard errors are robust, clustered at the state-quarter level and reported in parentheses below. Significance stars are: * p<0.10, ** p<0.05, *** p<0.01.

Table 6: The impact of Geographic Diversification on Bank Holding Company Value - State Instrumental Variables based on Interstate Branching Deregulation

Panel A: Second Stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 - Herfindahl Index of assets across states	-2.625	-3.118**	-3.889***	-8.695	-7.901**	-12.459*	-11.389***	-8.978*	-9.189***
	(2.335)	(1.294)	(1.128)	(7.834)	(3.968)	(7.179)	(4.164)	(5.008)	(3.294)
Bank and Macro Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quarter fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	23,944	23,944	23,944	23,944	23,944	23,944	23,944	23,944	23,944
F Test of instruments' joint significance	38.48	62.35	16.01	4.922	20.59	7.911	23.61	13.83	33.71
Excluded Instrument:									
Years since interstate branching deregulation	✓	✓							
(Years since interstate branching deregulation)^2		✓							
Years since interstate branching deregulation [nonparametric]			✓						
ln(Number of accessible states)				✓					
ln(Number of accessible states - weighted)					✓				
ln(Market Population)						✓			
ln(Market Population - weighted)							✓		
ln(Market Potential)								✓	
ln(Market Potential - weighted)									✓

This panel reports 2nd stage regression results from 2SLS analysis. The dependent variable is Tobin's *q* and given as (Capitalization + Perpetual Preferred Stock + Total Liabilities and Minority Interest)/(Total Assets). For expositional purposes Tobin's *q* is multiplied by 100. The endogenous variable '1-Herfindahl index of assets across states' is 1 - the sum of squared share of assets held in different states by the parent bank holding company. The excluded instruments are given in the rows titled 'Instruments': 'Years since interstate branching deregulation' is the number of years since the liberalization of interstate branching restrictions. 'Number of accessible states' is the number of states a bank holding company can enter because of bilateral or unilateral branching agreements. It is zero if a bank holding company is not allowed to branch into any other state apart from the state where it is headquartered in. 'Market Population' is the total population, excluding the holding company's headquarter state's population, a bank holding company can access due to bilateral or unilateral branching agreements. 'Market Potential' is 'Market Population' divided by the population of a holding company's headquarter state. As indicated, these variables are weighted by the relative distance of each state to every other state whereas the closest state receives a weight of one and the farthest state receives a weight of zero.
State and time dummies for each quarter are used. Standard errors are robust, clustered at the state-quarter level and reported in parentheses below. Significance stars are: * p<0.10, ** p<0.05, *** p<0.01.

Panel B: First Stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Years since interstate branching deregulation	0.010***	0.035***							
	(0.002)	(0.003)							
(Years since interstate branching deregulation)^2		-0.002***							
		(0.000)							
ln(Number of accessible states)				0.015**					
				(0.007)					
ln(Number of accessible states - weighted)					0.031***				
					(0.007)				
ln(Market Population)						0.012***			
						(0.004)			
ln(Market Population - weighted)							0.021***		
							(0.004)		
ln(Market Potential)								0.016***	
								(0.004)	
ln(Market Potential - weighted)									0.026***
									(0.004)
=1 if one year after interstate branching deregulation, 0 otherwise			0.079***						
			(0.012)						
=1 if two years after interstate branching deregulation, 0 otherwise			0.115***						
			(0.012)						
=1 if three years after interstate branching deregulation, 0 otherwise			0.128***						
			(0.012)						
=1 if four years after interstate branching deregulation, 0 otherwise			0.134***						
			(0.012)						
=1 if five years after interstate branching deregulation, 0 otherwise			0.145***						
			(0.013)						
=1 if six years after interstate branching deregulation, 0 otherwise			0.142***						
			(0.014)						
=1 if seven years after interstate branching deregulation, 0 otherwise			0.155***						
			(0.015)						
=1 if eight years after interstate branching deregulation, 0 otherwise			0.165***						
			(0.016)						
=1 if nine years after interstate branching deregulation, 0 otherwise			0.164***						
			(0.017)						
=1 if more than 10 years after interstate branching deregulation, 0 otherwise			0.156***						
			(0.018)						
Bank and Macro Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quarter fixed effects	✓	✓	✓	✓	✓	✓	✓	✓	✓
F Test of joint significance	38.48	62.35	16.01	4.922	20.59	7.911	23.61	13.83	33.71
Observations	23,944	23,944	23,944	23,944	23,944	23,944	23,944	23,944	23,944

Table 7: The impact of Geographic Diversification on Insider Lending - State Instrumental Variables based on Interstate Branching Deregulation

	Panel A1: Second Stage - Dependent Variable: Lending Indicator to Executive Officers							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 - Herfindahl Index of assets across states	1.219***	0.416***	0.330***	0.809***	0.673***	0.528***	0.304***	0.301***
	(0.451)	(0.119)	(0.103)	(0.216)	(0.213)	(0.122)	(0.040)	(0.037)
F-Test of joint significance	12.55	35.76	10.11	26.36	29.92	64.46	384.2	412.7
	Panel A2: Second Stage - Dependent Variable: Ln(Average Loan per Executive Officer)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1 - Herfindahl Index of assets across states	10.685***	4.089***	3.207***	8.339***	6.804***	5.351***	2.979***	2.963***
	(4.085)	(1.162)	(0.990)	(2.299)	(2.093)	(1.216)	(0.389)	(0.368)
F Test of joint significance	12.08	35.43	10.10	25.84	29.39	63.43	381.0	408.9
Bank and Macro Controls	✓	✓	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Quarter fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
Excluded Instrument:								
Years since interstate branching deregulation	✓	✓						
(Years since interstate branching deregulation)^2		✓						
ln(Number of accessible states)			✓					
ln(Number of accessible states - weighted)				✓				
ln(Market Population)					✓			
ln(Market Population - weighted)						✓		
ln(Market Potential)							✓	
ln(Market Potential - weighted)								✓

This table reports second stage regression results from a 2SLS analysis. The dependent variables are given in the panel title. 'Lending Indicator' is a dummy variable which takes on the value of one if a subsidiary extends a loan to an executive officer, and zero otherwise, 'ln(Average Loan per Executive Officer)' is the natural log of the average loan volume to executive officers. The endogenous variable '1-Herfindahl index of assets across states' is 1 - the sum of squared share of assets held in different states by the parent bank holding company. The excluded instruments are given in the rows titled 'Instruments': 'Years since interstate branching deregulation' is the number of years since the liberalization of interstate branching restrictions. 'Number of accessible states' is the number of states a bank holding company can enter because of bilateral or unilateral branching agreements. It is zero if a bank holding company is not allowed to branch into any other state apart from the state where it is headquartered in. 'Market Population' is the total population, excluding the holding company's headquarter state's population, a bank holding company can access due to bilateral or unilateral branching agreements. 'Market Potential' is 'Market Population' divided by the population of a holding company's headquarter state. As indicated, these variables are weighted by the relative distance of each state to every other state whereas the closest state receives a weight of one and the farthest state receives a weight of zero. For expositional purposes, 'Market Potential' is multiplied by 10,000. 'F-Test of joint significance' is the value from an F-Test of the joint significance of the excluded instruments in the first stage. State and time dummies for each quarter are used. Standard errors are robust, clustered at the state-quarter level and reported in parentheses below. Significance stars are: * p<0.10, ** p<0.05, *** p<0.01.

Table 8: The relationship between population, distance and BHC asset holdings: Zero-Stage

	(1)	(2)	(3)	(4)
ln(Population-Ratio)	-3.930***	-0.016	-4.589***	-0.050
	(0.120)	(0.035)	(0.164)	(0.042)
Distance (in 100 miles)	-1.718***	-0.141***	-1.727***	-0.217***
	(0.011)	(0.005)	(0.011)	(0.011)
State fixed effects	✓		✓	
State-Pair fixed effects		✓		✓
Bank Holding Company fixed effects			✓	✓
Quarter fixed effects	✓	✓	✓	✓
Observations	1,207,208	1,207,208	1,207,208	1,207,208

This table reports regression results from a state-quarter fixed effects OLS analysis. The dependent variable is the share of assets (in percentage points) a BHC holds in a state. 'Population ratio' is the total population in a BHC's home state divided by the population in state A; 'Distance in 100 miles' is the distance between a BHC's home county and the capital of state A (in 100 miles).
State fixed effects are separate dummy variables for (1) the BHC's home state and (2) all other state; state-pair fixed effects are separate dummy variables for each BHC home-state–other-state-pair. Time dummies for each quarter are used. Standard errors are robust, and reported in parentheses below. Significance stars are: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: The impact of Geographic Diversification on Bank Holding Company Value - BHC Instrumental Variables based on a Gravity-Deregulation Model

	(1)	(2)	(3)
Panel A: Second Stage			
	Tobin's Q	Lending Indicator	Ln(Average Loan per Executive Officer)
1 - Herfindahl Index of assets across states	-7.918**	1.752**	17.734**
	(3.891)	(0.737)	(7.183)
Bank and Macro Controls	✓	✓	✓
Bank Holding Company fixed effects	✓	✓	✓
Quarter fixed effects	✓	✓	✓
Observations	23,942	48,970	48,625
F Test of instruments' joint significance	13.76	25.45	25.69
Panel B: First Stage			
1 - Herfindahl Index of assets across states (Predicted)	0.246***	0.380**	0.380**
	(0.066)	(0.150)	(0.150)

This panel reports 2nd stage regression results from 2SLS analysis. The dependent variable is given in the column header. The endogenous variable '1-Herfindahl index of assets across states' is 1 - the sum of squared share of assets held in different states by the parent bank holding company. The excluded instrument is 1 - Herfindahl Index of assets across states (Predicted), which is computed as follows:
Using a gravity-deregulation model, we estimate how (a) the distance between a BHC's home county and the capital of state A and (b) the difference in population between a BHC's home state and state A are related to the share of assets a BHC holds in state A using a OLS regression and controlling for state and quarter fixed effects. Using coefficients from this regression, we predict the share a BHC holds in a state and quarter, where we impose that BHC's projected holdings of assets are zero in states that they cannot enter because of interstate bank regulations. Finally, we aggregate the information for each BHC at the BHC-quarter level and compute the predicted Herfindahl Index of assets across state (Predicted).
Bank Holding Company fixed effects and time dummies are used. Standard errors are robust, and reported in parentheses below. Significance stars are: * p<0.10, ** p<0.05, *** p<0.01.