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Do Bank Insiders Impede Equity Issuances?

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Abstract

We construct a novel panel dataset on insider ownership for about 600 U.S. bank holding companies from 2003 to 2014 and evaluate whether ownership structure influences banks' equity composition and recapitalization decisions around the Global Financial Crisis (GFC). Before the crisis, banks with higher insider ownership relied less on common stock and more on retained earnings. Throughout the sample period, insider ownership changes little within banks. Following the onset of the GFC, banks with larger insider ownership sold significantly less common stock than comparable peers. This effect is more pronounced where insiders enjoy greater private benefits of control, as proxied by insider lending and earnings opacity. The findings suggest insiders are reluctant to dilute their shares and lose those private benefits. These results hold when employing instrumental variables for insider ownership. Our findings imply that ownership structure affects banks' equity issuances during crises, highlighting the importance of considering ownership when designing and evaluating regulatory reforms.

Keywords: Ownership Structure, Equity Issuances, Banking, Financial Crises, Regulation

JEL Codes: G32; G21; G28

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1. Introduction

The recent collapse of Silicon Valley Bank (SVB) and its failure to raise new equity are stark reminders of the linkages between bank equity and economic stability (Metrick 2024). Banks with more equity lend more, create greater liquidity, and better withstand and recover from crises (e.g., Thakor 2014; Baron et al. 2021; Berger and Bouwman 2013; Jorda et al. 2021). These connections between bank equity and the economy's resilience to aggregate shocks highlight the importance of understanding the factors shaping banks' equity issuances. Banks' ownership structure is one such potential factor.

Research offers conflicting perspectives on the impact of ownership structure on banks' stock issuances. On the one hand, insiders may resist stock sales to protect their private benefits of control, especially when those benefits are sizeable. (Barclay and Holderness 1989; Doidge et al. 2009). From this "dilution reluctance" perspective, greater insider ownership will reduce stock sales, potentially making the economy less resilient to aggregate shocks. On the other hand, greater insider ownership could facilitate coordination among stakeholders with differing interests, easing season offerings in bad times (e.g., Chakraborty and Gantchev 2013). From this "coordination" perspective, insider ownership can facilitate stock sales, boosting stability. Which force dominates for banks is an open empirical question.¹

The paper provides the first large-sample evidence for U.S. bank holding companies (BHCs). We begin by (1) constructing a unique panel dataset of insider ownership (i.e., shares held by executive officers and directors) for about 600 BHCs over the period 2003 – 2014 and (2) documenting the evolution of insider ownership and its relationship with BHC equity capital. We document that insider ownership, on average, changes little over time. Although

¹ We are not arguing that these are the only potential factors shaping stock issuances. For example, adverse selection may curtail banks with greater insider ownership from selling shares in response to aggregate shocks. If insiders have greater information about banks and shocks cause markets to reduce their valuation of banks more than insiders' assessments, this could lead high insider ownership banks to sell less stocks than otherwise identical widely-held banks.

there is a slight downward trend in average insider ownership from 2003 through 2014, the trend is statistically insignificant, and there is no notable change around the GFC. Furthermore, annual changes in insider ownership tend to be small, equaling zero for about one-third of BHC-year observations and falling between -0.5% and +0.5% for over half the sample.

We also document a significant relationship between insider ownership and the structure of BHC equity capital, as measured by the three components of total equity capital: common stock, preferred stock, and retained earnings. We use panel regressions that include BHC and year-fixed effects and, in some specifications, an array of balance sheet characteristics. Across different specifications, we discover that BHCs with larger insider ownership tend to have equity structures with smaller proportions of common stock and larger proportions of retained earnings. The estimates suggest that a one-standard-deviation increase in insider ownership is associated with a 10% standard-deviation reduction in the common stock to total equity capital ratio. We do not find a strong association between insider ownership and preferred stock.

Next, we turn to our core question: Did insider ownership shape BHCs' common stock sales following the onset of the GFC? We use several strategies to isolate the impact of insider ownership on bank equity changes, and although our focus is on common stock sales, we also analyze the other components of total equity capital. Given that insider ownership changes little, our primary strategy entails using a difference-in-differences specification with quarterly BHC observations from Q1/2007 through Q4/2010. The dependent variable is the ratio of common stock sales, preferred stock sales, or retained earnings changes to total equity capital. The primary explanatory variable of interest is the interaction between insider ownership measured in 2008 and a dummy variable that equals one after the onset of the GFC and zero before (*Post*). Besides conditioning on BHC and time-fixed effects, we control for BHC size, its focus on lending and trading revenues, its reliance on deposits, loan quality, whether it sold

common stock in the previous year, and many other time-varying BHC traits. In addition, we include interactions between each of these controls and *Post*.

BHCs with more insider ownership sell less common stock following the GFC's start than otherwise similar BHCs in which insiders hold smaller ownership stakes. The estimated impact is economically large, indicating that BHCs with one standard deviation greater insider ownership sell about 6% of a standard deviation less common stock (as a share of total equity capital) every quarter following the GFC's start. The results hold across various sub-samples. For example, the results do not depend on whether banks were part of the Capital Purchase Program (CPP) that encouraged BHCs to sell preferred stock to the Treasury (Q4/2008), whether they are S-corporations, or whether they are large or small banks. We also examine the dynamic relationship between insider ownership and changes in bank equity capital. Consistent with the difference-in-differences results, we find a distinct change following the onset of the GFC: BHCs with more insider ownership sell less common and preferred stock after Q2/2008 than otherwise similar BHCs, but there is not a robust link between insider ownership and changes in retained earnings during this period.

Next, we delve deeper into the dilution reluctance channel and find evidence consistent with this proposed mechanism linking ownership structure and stock sales. In particular, we explore whether the relationship between insider ownership and stock sales differs across BHCs in ways consistent with the view that bank insiders are reluctant to reduce their private benefits of control. One implication of this view is that insiders' resistance to diluting their control rights through stock sales will be stronger among banks in which insiders enjoy greater private benefits of control. We test this prediction using two measures of insiders' private benefits of control: (a) the share of loans allocated to bank insiders and (b) the level of bank opacity. Since insider loans directly benefit insiders, we expect that insiders at banks with a larger share of loans flowing to insiders enjoy greater control benefits and will be more

reluctant to dilute their control rights by issuing common stock in response to the crisis. Opacity can give insiders greater latitude to extract private benefits by hindering effective governance by non-insiders (e.g., Jiang, Levine, and Lin 2016). Thus, we expect that insiders at more opaque banks will be more resistant to engaging in new stock sales. Consistent with the dilution reluctance view, we discover that only when private benefits are sufficiently large—only when the share of insider loans and opacity are sufficiently large—is there a negative and significant effect of insider ownership on equity issuances.

Finally, we use instrumental variables to address additional identification concerns. In particular, unobserved differences in the ability of inside and outside investors to monitor bank managers could simultaneously influence insider ownership and the BHC's willingness and ability to sell stock. Our strategy for building a BHC-specific instrumental variable (IV) for insider ownership starts from the following observation: When BHCs expand geographically, they often raise equity capital from "outsiders," reducing insider ownership. Therefore, we build a BHC-specific IV for insider ownership designed to measure exogenous sources of variation in geographic expansion and, hence, insider ownership. We exploit three past findings to construct the IV (e.g., Rice and Strahan 2010; Goetz, Laeven, and Levine 2013, 2016). First, banks expanded when regulatory authorities removed impediments to the geographic expansion of banks through interstate banking or branching. Second, there were often lags between removing regulatory restrictions on expansion and actual expansion. Third, the degree to which BHCs expanded into new markets was negatively correlated with the geographic distance to those markets. Based on these findings, we form a BHC-specific instrumental variable that is the natural logarithm of the average number of years since neighboring states removed their entry restrictions for banks in BHC's headquarters state. After documenting the strength and validity of the instrument, we confirm that insider ownership materially reduced stock sales following the crisis.

Our paper builds on existing empirical evidence on bank ownership structure. For instance, Saunders, Strock, and Travlos (1990) find that shareholder-controlled banks take more risks than those controlled by managers, who enjoy large private benefits from the bank's survival. Research also shows that bank risk is generally higher in banks with more concentrated ownership, consistent with theories predicting that owners with substantial cash flow rights induce banks to increase risk-taking (e.g., Laeven and Levine 2009; Beltratti and Stulz 2012). Focusing on the GFC, Fahlenbrach and Stulz (2011) find that banks with larger managerial ownership, if anything, performed worse during the GFC, while Mücke et al. (2024) find that the appointment of independent directors by the U.S. government under the CPP improved performance for affected banks following the crisis. However, previous research does not assess how banks' ownership structure shapes their stock sales in response to the GFC, which is the focus of our study.

Our paper complements recent research on equity issuances by banks. Lepetit, Saghi-Zedek, and Tarazi (2015) show that following the global financial crisis, European banks were more likely to reduce lending rather than raise new equity when (a) the bank's ultimate owner in a pyramid had control rights that materially exceed cash-flow rights and (b) the bank operated in a country with weak shareholder protection laws. We complement their work by focusing on the influence of inside owners on stock sales, as opposed to ownership pyramids. This is especially relevant when examining U.S. BHCs as differences between control and cash flow rights are less central in the case of U.S. banks (e.g., Caprio, Laeven, and Levine 2007). Using an international sample, Dinger and Vallascas (2016) show that poorly capitalized banks are more likely to issue equity. Besides focusing on U.S. BHCs, our work differs by exploring the role of insiders in shaping equity structure and by assessing the response of BHCs with different ownership structures to an adverse shock. Bennett, Goplan, and Thakor (2021) document that a bank's CEO compensation depends more on equity performance than CEO

pay in other industries. This may help explain why bankers are particularly resistant to having their banks sell stock. Our work complements their study by considering the role of insiders and by showing that the cross-bank sensitivity of stock issuances to ownership is consistent with the dilution reluctance view.

Our paper also relates to recent research by Baron and Xiong (2017), Baron, Verner, and Xiong (2020), and Baron (2020). This research examines the countercyclical equity issuance puzzle: banks raise less common equity during credit expansions and comparatively more equity during economic downturns. For example, Baron (2020) presents a model and evidence consistent with the view that government guarantees to bank creditors help explain why banks resist equity issuances during economic booms. While also examining the equity issuance decisions of banks, we focus on testing whether and how ownership structure helps account for the different equity issuance decisions of banks following a major crisis.

Furthermore, our research contributes to an extensive corporate finance literature on the private benefits of control (e.g., Jensen 1986; Jensen and Meckling 1986; and Dyck and Zingales 2004). Theory provides conflicting views regarding the willingness and ability of inside owners to have their firms raise funds through equity issuances. As emphasized above, corporate insiders may be reluctant to dilute their ownership stake and private benefits (Barclay and Holderness 1989; Doidge et al. 2009). On the other hand, insider control can facilitate the ability of owners to coordinate to raise equity in times of duress (Chakraborty and Gantchev 2013). This literature, however, primarily focuses on non-financial and stock-exchange listed firms for which data on insider shareholdings is publicly available. We contribute by analyzing BHCs with ownership data provided in FR-Y6 regulatory filings. These data offer a unique setting to study the effects of different ownership structures on equity issuance decisions.

Finally, our study speaks to recent policy reforms that increasingly emphasize the *quality* of bank capital, not just its *quantity* (e.g., Hoshi and Kashyap 2010 and Jiménez et al.

2017). For example, Basel III introduced a minimum common equity requirement to ensure banks have substantial loss-absorbing capital. These regulatory changes, however, have not yet considered ownership structure. Our work stresses the importance of ownership structure. We find that ownership structure shapes common equity issuances in response to a crisis and banks' resilience to adverse shocks. This finding highlights the value of considering ownership structure when designing bank regulations and assessing banks' abilities to absorb losses and cushion the impact of losses on the economy.

2. Bank Ownership and Balance Sheet Information: Data and Sample Construction

We start by selecting all BHCs that filed consolidated balance sheet information via FR Y-9C regulatory reports in 2008, yielding initial data on 963 BHCs. We limit the sample to BHCs that file FR Y-9C reports because we require information on balance sheet information for our empirical analyses. We exclude BHCs not registered as stock corporations and BHCs owned by other holding companies to focus on BHCs with direct ownership by stockholders. This reduces the sample to 882 BHCs. The sample changes over time because of changes in reporting requirements concerning which BHCs must file FR Y-9C reports. In 1999, BHCs with an asset size of at least \$150 million had to file FR Y-9C reports. Effective March 2006, this threshold was increased, and only BHCs with more than \$500 million in assets had to file FR Y-9C reports. In March 2015, regulators increased this asset threshold to \$1 billion. As a result of these reporting requirement changes, the number of BHCs filing FR Y-9C reports declined over time, as shown in Appendix Table A1 (column a).²

We collect data on the ownership structure of U.S. BHCs to examine the relationship between insider ownership and banks' stock sales. U.S. law requires BHCs to file annual FR

² Furthermore, regulatory changes due to the Dodd-Frank Act of 2010 made the Federal Reserve the supervisor of several types of financial institutions (Savings and Loan Holding Companies, Intermediate holding companies of foreign banking organizations), requiring these institutions to file FR Y-9C reports.

Y-6 reports with information on the identity and ownership stakes of principal shareholders and all insiders, including directors and officers. We obtain these reports in scanned format from the SNL Financial database of S&P Global Market Intelligence and manually convert the information from these scans into our ownership variables. Appendix Figure A1 provides an example of a FR Y-6 filing.³

We build a time series of the percentage of BHC shares held by each BHC's insiders (i.e., its officers and directors), which we label *Insider Ownership*.⁴ We start the construction of this panel data set in 1996, the earliest year for which ownership data is available in SNL Financial and end the data collection in 2018. This yields an unbalanced panel because not all BHCs have ownership information for all years. In particular, ownership data is often missing before 2003, and we lose many BHCs after 2014 due to an increase in the asset-size threshold for filing FR Y-9C reports. To ensure a reasonably balanced sample for our analysis, we limit the sample to the period from 2003 to 2014. From 2003 to 2014, ownership data exist for about 600 BHCs each year, varying from 608 in 2003 to 628 in 2014, as shown in Appendix Table A1.

As depicted in Figure 1, our coverage of U.S. banking assets increases over time. In 2003, BHCs with *Insider Ownership* data jointly accounted for about \$4.8 trillion (or 38% of banking assets). In 2014, BHCs with ownership data held \$13.9 trillion of assets, representing 76% of total banking system assets. Increases in BHC size and regulatory changes help account for this pattern. While mergers and acquisitions (M&As) reduced the number of banks, the combined asset share of all BHCs that leave our sample due to M&As during the entire period

³ Some Federal Reserve Banks publish FR Y-6 reports on their website. These reports are, however, only available for BHCs in the Reserve banks' district and do not cover earlier periods. We looked at forms provided by the Federal Reserve banks to cross-check that we are not missing any data not provided by SNL Financial.

⁴ The FR Y-6 filings provide detailed information on the identity and ownership share of all insiders (directors and officers) and principal shareholders. When a person's ownership share is very small the filings might not disclose the exact ownership share, but rather indicate that a person owns "less than 0.1% of shares." In such cases, we assume the person holds 0%. To determine the ownership share of all insiders we aggregate shares at the BHC level and set aggregate insider ownership shares equal to zero if the summation across all insiders is less than 5% of total shares, a standard cutoff in the literature on private control benefits.

is small, amounting to about 6% of U.S. banking assets. Appendix Table A1 shows the number of BHCs in our sample over time. It decomposes changes in the sample due to rechartering to a different incorporation type with different reporting requirements (column b), changes in filing requirements (column c), missing ownership data (column d), and exits (column f). Appendix Table A2 reports the per annum aggregate assets for each of aforementioned category.

We use the FR Y-9C reports to compute the three components of total equity capital: (a) the share of common stock and surplus in a BHC's total equity capital (*Common stock / Total equity capital*),⁵ (b) the share of preferred stock in a BHC's total equity capital (*Preferred stock / Total equity capital*), and (c) the share of retained earnings in a BHC's total equity capital (*Retained earnings / Total equity capital*), where *Retained earnings* is the accumulated stock of retained earnings, not the flow in any particular period. We also compute other bank characteristics: the natural logarithm of total assets ($\log(\text{Total assets})$), a BHC's share of total equity capital, scaled by total assets ($\text{Total equity capital} / \text{Total assets}$), a BHC's share of other earning assets in total assets ($\text{Other earning assets} / \text{Total assets}$), a BHC's share of total deposits in total assets ($\text{Total deposits} / \text{Total assets}$), and a BHC's credit, i.e. total loans and unused lines of credit, scaled by total assets ($\text{Credit} / \text{Total assets}$). Appendix Table A3

⁵ For brevity, we refer to common stock and surplus as common stock when labeling the variable. Surplus, often called the share premium, is the net amount formally transferred to the surplus account, including capital contributions and any amount received for common stock over its par or stated value on or before the report date. It is included in the stockholders' equity section of the balance sheet.

provides detailed information on the employed variables and the construction of these variables based on reporting codes from FR Y-9C reports.

3. Descriptive Statistics and Patterns

3.1 Descriptive statistics

Table 1 reports descriptive statistics for BHCs in our sample. Panel A reports summary statistics on BHC characteristics over the 2003-2014 period. For example, the average value of *Insider Ownership* across BHCs and time was 31% over the sample period, with a standard deviation of 31%.

Panel B reports correlations between *Insider Ownership* and several BHC balance sheet characteristics. We find a statistically significant and positive correlation between *Insider Ownership* and (a) a BHC's share of deposits in total assets (*Total deposits / Total assets*) and (b) retained earnings as a share of total equity capital (*Retained earnings / Total equity capital*). We find a statistically significant and negative correlation between *Insider Ownership* and (a) BHC size ($\text{Log}(\text{Total Assets})$), (b) BHC capitalization, as measured by *Total equity capital / Total assets*, (c) the proportion of common stock in BHC equity capital (*Common stock / Total equity capital*), (d) the proportion of preferred stock in BHC equity capital (*Preferred stock / Total equity capital*), and (e) the proportion of credit in bank assets (*Credit / Total assets*). Thus, banks where insider ownership is more prevalent tend to be smaller, less capitalized, rely more on deposit funding, and provide less credit as a share of total assets. Regarding the

composition of bank equity, banks where insiders own larger stakes tend to have less preferred and common stock (and surplus) but more retained earnings as a share of total equity capital.⁶

3.2 The level and change of insider ownership

Figure 2 depicts the level and change of insider ownership. Panel A provides the average level of insider ownership and the 95% confidence interval for each year. Average *Insider Ownership* decreased slightly and statistically insignificantly from 2003 through 2014, falling from around 33% in 2003-2007 to about 28% in 2014. Panel B illustrates the evolution of the distribution of *Insider Ownership*. Consistent with the pattern of average *Insider Ownership* depicted in Panel A, there is a slight downward trend in *Insider Ownership* at the 25th, 50th, and 75th percentiles of *Insider Ownership*. Note that *Insider Ownership* does not exhibit a notable change around the GFC. Since these findings might reflect changes in the sample of BHCs, not in the ownership structure of BHCs, we (1) confirm that these patterns hold when restricting the sample to BHCs that remain in the sample throughout the 2003-2014 period (see Appendix Figure A2) and (2) examine the annual change of *Insider Ownership* at the BHC level.

As shown in Panel C, most annual changes in *Insider Ownership* are zero or very close to zero. Specifically, we examine the change in *Insider Ownership*, measured as a percent, for each BHC-year. The histogram represents the fraction of BHC-year observations with annual changes in insider ownership in 1%-point increments. The bar centered around zero provides the fraction of observations with an annual change in insider ownership between -0.5 and +0.5

⁶ Appendix Tables A4A and A4B provide the corresponding summary statistics for the quarterly sample.

percentage points. Over half of all observations involve an annual change between -0.5 and +0.5 percentage points, and about one-third involve no change.

We next examine long-run changes of insider ownership within banks rather than the annual changes at the BCH-year level depicted in Figure 2. In Figure 3, we first group all banks into 50 equally sized bins depending on their initial level of *Insider Ownership* in 2003. Second, for each bin of BHCs, we compute average *Insider Ownership* in the first year and 2014. Third, for each bin, we plot the average insider ownership level in 2014 (y-axis) against initial insider ownership (x-axis). The dashed line represents the 45-degree line. Circles above/below the 45-degree line indicate that average *Insider Ownership* (for a particular bin) has increased/decreased. As shown in Figure 3, most circles are very close to the 45-degree line, indicating little change in *Insider Ownership* over the 2003-2014 period. However, consistent with Figure 2, most circles fall slightly below the 45-degree line, indicating *Insider Ownership* falls over the long run, where declines tend to be somewhat larger for BHCs with initially higher levels of insider ownership.

The key takeaways from these descriptive statistics on *Insider ownership* are as follows: First, *Insider ownership* does not change much in the short or long run. About one-third of annual changes in *Insider ownership* equal zero, and when examining *Insider ownership* at the beginning (2003) and end (2014) of the sample, most observations fall very close to the 45-

degree line. Second, there is a slight, though insignificant, downward trend in *Insider ownership* with no appreciable change around the GFC.⁷

4. Insider ownership and equity structure

We begin by examining the relationship between ownership structure, as measured by *Insider ownership*, and equity structure, as measured by three components of total equity capital: common stock and surplus, preferred stock, and retained earnings.

We estimate the following panel regression over the 2003-2004 period:

$$y_{i,t} = \beta \text{Insider ownership}_{i,t} + \gamma \mathbf{X}_{i,t} + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (1)$$

The dependent variable, $y_{i,t}$, is either *Common stock / Total equity capital*, *Preferred stock / Total equity capital*, or *Retained earnings / Total equity capital* for BHC i in year t . *Insider Ownership* $_{i,t}$ is the percentage of BHC i 's shares held by its insiders (i.e., officers and directors) in year t ; $\mathbf{X}_{i,t}$ is a vector of BHC characteristics that control for BHC size ($\text{Log}(\text{Total Assets})$), leverage ($\text{Equity} / \text{Assets}$), asset breakdown ($\text{Credit} / \text{Assets}$ and $\text{Other Earning Assets} / \text{Assets}$), and reliance on deposits ($\text{Deposits} / \text{Assets}$). The regression also includes BHC (α_i) and year-fixed (α_t) effects. The coefficient β measures how the components of total equity capital vary with insider ownership after conditioning on this array of control variables. We report standardized coefficients indicating the estimated number of standard deviation changes in the dependent variable associated with a one standard deviation change in *Insider ownership*. We report standard errors clustered at the BHC level in parentheses.

⁷ We were concerned that BHC acquisitions or exits following the onset of the GFC could differ by insider ownership in ways that bias the results. If BHCs with greater insider ownership are more likely to sell subsidiaries to raise capital or to be acquired by BHCs and exit the sample, we would likely overestimate the degree to which the dilution reluctance of inside owners reduces common equity sales. However, we do not find evidence supporting these concerns. Insider ownership (1) is not significantly correlated with the sale (or purchase) of subsidiaries (Appendix Table A7) and (2) is negatively, not positively, related to the bank being acquired (Appendix Table A8).

As reported in Table 2, we find a strong relationship between BHCs' ownership and equity structure. Focusing first on common stock, *Insider ownership* enters negatively and significantly in the *Common stock / Total equity capital* regressions. This finding holds, with little change in the estimated coefficient on *Insider ownership*, when (1) controlling only for BHC- and year-fixed effects (column 1) or (2) also controlling for the full array of controls discussed above (column 2). The relationship between ownership structure and the share of common stock in total equity is also economically significant. The estimated coefficients suggest that a one-standard-deviation increase in *Insider ownership* is associated with a 10% standard-deviation reduction in *Common stock / Total equity capital*.

Next, we turn to the other components of equity structure: preferred stock and retained earnings. The Table 2 regressions indicate no significant relationship between *Insider Ownership* and *Preferred stock / Total equity capital*. However, ownership structure is positively linked to retained earnings: *Insider ownership* enters positively and significantly in the *Retained earnings / Total equity capital* regressions (columns 5-6). The estimates indicate that a one-standard-deviation increase in *Insider ownership* is associated with a boost in *Retained earnings / Total equity capital* of 9% of its sample standard deviation. The findings suggest that BHCs with larger *Insider ownership* tend to have equity structures with smaller proportions of common stock and larger proportions of retained earnings.

5. Insider Ownership and Stock Sales and Retained Earnings

This section addresses the question: Did ownership structure shape how BHCs adjusted their equity structure in response to the GFC? Specifically, did insider ownership shape BHCs'

common and preferred stock sales and retained earnings once the GFC started? We examine this question using quarterly data from Q1 2007 through Q4 2010.

5.1 Baseline regression analyses

We estimate the following panel regression:

$$\Delta y_{i,t} = \beta \text{ Insider ownership}_i * \text{Post}_t + \gamma \mathbf{Z}_{i,t} + \delta \mathbf{Z}_{i,t} * \text{Post}_t + \alpha_i + \alpha_t + \varepsilon_{i,t} \quad (2)$$

where the dependent variable, $\Delta y_{i,t}$, is either *Sale of common stock / Total equity capital (Q1/2007)*, *Sale of preferred stock / Total equity capital (Q1/2007)*, or *Addition to retained earnings / Total equity capital (Q1/2007)* for BHC i in quarter t . Note that *Addition to retained earnings* is the addition to the stock of retained earnings during a quarter, not the accumulated stock of retained earnings as in Equation (1). *Total equity capital (Q1/2007)* is the total value of equity capital in the first quarter of 2007. *Insider ownership_i* is measured in 2008.⁸ Post_t equals zero before the start of the GFC in Q3/2008 and one afterward. $\mathbf{Z}_{i,t}$ is a set of BHC controls that includes (1) $\mathbf{X}_{i,t}$ from equation (1) (i.e., BHC size ($\text{Log}(\text{Total Assets})$), leverage ($\text{Equity}/\text{Assets}$), lending focus ($\text{Credit}/\text{Assets}$ and $\text{Other Earning Assets} / \text{Assets}$), and reliance on deposits ($\text{Deposits}/\text{Assets}$)) and (2) three indicator variables that respectively equal one if the BHC (a) has trading revenue to net income share greater than 15% in over the previous four quarters, (b) has real estate charge-offs in the previous four quarters, and (c) sold common stock in the previous year and zero otherwise. We also include the interactions between each variable in $\mathbf{Z}_{i,t}$ and Post_t . The results hold when excluding those terms. The regressions continue to include BHC (α_i) and year-fixed (α_t) effects.

⁸ We use 2008 rather than earlier years because there are more data on insider ownership after 2007 and, as shown, insider ownership typically changes little over time. Our results remain if we use the information on insider ownership from 2007.

Table 3 reports regression results focusing on the interaction term, $Insider\ ownership_i * Post_t$. For each dependent variable, we provide three regressions that differ by control variables. The regression first controls for BHC- and year-fixed effects. The second adds the time-varying BHC-specific controls from Equation (1), i.e., $\mathbf{X}_{i,t}$, and interactions with $Post_t$. The third regression includes the complete set of controls, $\mathbf{Z}_{i,t}$ and their interactions with $Post_t$. The coefficient estimates on $Insider\ ownership_i * Post_t$ measure the response of each component of total equity capital to the GFC while differentiating by insider ownership. We report standardized coefficient estimates and standard errors clustered at BHC and quarter levels.

BHCs with more insider ownership sell less common stock following the GFC's start than otherwise similar BHCs in which insiders hold smaller ownership stakes. As reported in Table 3, $Insider\ ownership_i * Post_t$ enters negatively and statistically significantly in all regressions in which the dependent variable is *Sale of common stock / Total equity capital (Q1/2007)*. While there is some evidence that insider ownership reduces the sale of preferred stock following the GFC's start (columns 4-6), the results are less robust than the common stock sale findings. Furthermore, the response of retained earnings to the onset of the GFC does not differ robustly by insider ownership (columns 7-9).

The estimated relationship between inside ownership and common equity sales following the start of the GFC is economically meaningful. For example, BHCs with one standard deviation greater *Insider ownership* tend to sell about 6% of a standard deviation less common stock (as a share of total equity capital) every quarter following the onset of the crisis.

To put this in dollar terms, consider (1) BHCs with “high” insider ownership, i.e., the average among BHCs with *Insider ownership* at least 0.5 standard deviations above the sample mean, and (2) otherwise similar BHCs with “low” insider ownership, i.e., average insider ownership among BHCs with *Insider ownership* at least 0.5 standard deviations below the

sample mean. The “high” insider ownership BHCs have an average *Insider Ownership* of 47%, while the “low” insider ownership BHCs have an average *Insider ownership* of 17%, where the difference is 30 percentage points. The estimated coefficient on *Insider ownership*_{*i,t*} * *Post*_{*t*} indicates that in the high insider ownership BHC, quarterly sales of common stock as a proportion of total equity capital in Q1/2007 will be 0.19 percentage points lower than those in the low insider ownership bank ($0.19 = 3.24 \times 0.060$) following the start of the GFC.⁹ When we aggregate these differences in the quarterly sale of common stock over the nine quarters following Q2/2008, i.e., the period Q3/2008 to Q4/2010, we find that the share of common stock in total equity capital at “low” insider ownership BHCs is 1.7 percentage points ($= 9 \times 0.19$) higher than at “high” insider ownership BHCs. This is a sizeable difference: Using information for 2008, we compute that the difference in common stock (and surplus) in BHC total equity capital for “low” versus “high” insider ownership BHCs is 10 percentage points (see Appendix Figure 3). The gap in BHC’s dependence on common stock (and surplus) between “high” and “low” insider ownership BHCs has increased by almost a quarter after Q3/2008.

BHC size and capital-asset ratios are also strongly linked with common stock sales. Larger BHCs (*Log(Total Assets)*) issued more common stock following the start of the GFC than otherwise similar BHCs. This finding is unsurprising since larger banks face fewer barriers to conducting seasoned equity offerings, and regulators put more pressure on larger BHCs to issue new common stock following the stress-test results. We also find that more capitalized banks (*Total equity capital/Total assets*) issued more common stock once the crisis hit.

⁹ The coefficient estimates from column 3 of Table 3 indicates that a one standard deviation increase in Insider ownership is associated with a 0.060 standard deviation increase in the Sale of common stock / Total equity capital (Q1/2007). The standard deviation of Sale of common stock / Total equity capital (Q1/2007) is 0.0324 (Appendix Table A4). A standard deviation difference in Insider Ownership thus translates into a lower Sale of common stock / Total equity capital (Q1/2007) of 0.0019 or 0.19 percentage points.

Nevertheless, the estimates on $Insider\ ownership_i * Post_t$ suggest that the degree of insider ownership is not simply proxying for bank capitalization.

5.2 Robustness: Subsamples

We were concerned that a particular subset of banks might drive the results. We address this concern by examining three subsamples of banks. The first subsample excludes the banks in the Supervisory Capital Assessment Program (SCAP). These were the largest 19 U.S. banks subject to the Federal Reserve “stress tests” during the crisis. The second subsample excludes BHCs filing tax returns as Subchapter S corporations. If corporations meet specific requirements, they may file their tax returns as S corporations, avoiding double taxation of profits, i.e., the taxation of profits at the BHC and individual shareholder levels. Since this may also shape a BHC’s insider ownership and sale of common stock, we exclude S-corporations in the second subsample. The third subsample excludes large BHCs, dropping all banks with more than \$5 billion of total assets from the sample. Panels A-C of Table 4 provide the regression results for the three subsamples using the same regression specification employed in columns 3, 6, and 9 of Table 3, i.e., the regression specification with the complete set of controls.

As shown, the results are robust. The estimated coefficients on $Insider\ ownership_{i,t} * Post_t$ are similar to those reported in Table 3 for the complete sample. Furthermore, the estimated coefficients differ little across the three subsamples. These analyses reduce concerns that the results are sensitive to altering the subset of BHCs across these three dimensions.

5.3 Robustness: Dynamics

As an additional robustness test, we examine how the relationships between *Insider ownership* and the components of total equity capital evolve over the sample period.

Specifically, we estimate the following equation over the 16 quarters from Q1/2007 to Q4/2010:

$$\Delta y_{i,t} = \sum_{t=1}^{15} (\theta_t \text{Insider ownership}_i * D_t + \lambda_t \mathbf{Z}_{i,t} * D_t) + \alpha_t + \varepsilon_{i,t}, \quad (3)$$

where $y_{i,t}$ is either (1) the *Sale of common stock / Total equity capital (Q1/2007)*, (2) the *Sale of preferred stock / Total equity capital (Q1/2007)*, or (3) *Addition to retained earnings / Total equity capital (Q1/2007)* of BHC i in quarter t , respectively. D_t is a vector of 15 dummy variables for quarters Q2/2007 through Q4/2010 (Q1/2007 is omitted), and each dummy variable equals one in the designated quarter and zero otherwise. The other variables are the same as in Equation (2). The coefficient, θ_t , estimates the differential relationship between insider ownership and changes in the total equity capital components in quarter t relative to the baseline quarter Q1/2007. Furthermore, by conditioning on $\mathbf{Z}_{i,t} * D_t$, we allow the relationship between the dependent variables and each control variable in Z to evolve, as captured by λ_t . This helps isolate the independent, dynamic relationship between *Insider ownership* and changes in the components of total equity capital.

Besides examining the differential association between insider ownership and changes in the total equity components *in each quarter*, we also compute the cumulative differential effect $\omega_{i,t}$ between insider ownership and the total equity components from Q1/2007 until quarter t as:

$$\omega_t = \left[\sum_{j=Q1/2007}^t \hat{\theta}_j \right]_t.$$

Figure 4's three upper panels report the estimated values of θ_t , i.e., the differential effect in each quarter, while the lower panels provide the cumulative differential effects (ω_t) of the link between insider ownership and the changes in the total equity capital components. The dependent variables across the three upper panels are the *Sale of common stock / Total equity capital (Q1/2007)*, *Sale of preferred stock / Total equity capital (Q1/2007)*, and Addition o

retained earnings / Total equity capital (Q1/2007), respectively. The lower panels are defined similarly for the cumulative changes in these three components of total equity capital. For the lower panels, we compute the 95% confidence interval in period t by computing the standard deviation of the linear combination of the estimated coefficients until period t .

The overall message from Figure 4 is consistent with the regression results in Tables 3 and 4: BHCs with more insider ownership sell less common and preferred stock after Q2 2008 than otherwise similar BHCs, but there is not a clear, robust relationship between insider ownership and how retained earnings evolve after the start of the GFC. Focusing first on preferred stock, Figure 4 shows that for the two quarters immediately after the beginning of the crisis (Q4/2008 – Q1/2009), BHCs with higher insider ownership sold less preferred stock, but this differential relationship based on insider ownership becomes statistically and economically unimportant afterward. This finding is consistent with the U.S. Treasury pressuring banks to sell preferred shares to the Treasury as part of the CPP and higher-insider-ownership BHCs resisting that pressure more effectively. For common stock, the strong, negative relationship between insider ownership and common stock during several quarters begins after Q1/2009, i.e., after the intense period of preferred stock sales.

6. Mechanism: Dilution Reluctance

We next test whether the relationship between insider ownership and stock sales varies across bank characteristics in ways consistent with the view that bank insiders are reluctant to reduce their private benefits of control by issuing equity. These tests augment our identification strategy by providing additional information on one proposed mechanism linking ownership structure and stock sales.

One implication of the dilution reluctance view is that reluctance should be stronger—hence, stock sales should be smaller—among BHCs in which insiders enjoy greater private

benefits of control. To test this prediction, we employ two measures of BHC's private benefits of control. The first measure—insider lending—gauges the degree to which banks extend credit to bank insiders, i.e., executive officers and directors. Regulatory filings report the book value of loans to insiders for subsidiary banks. Using information on the lead bank in a BHC holding structure (i.e., the largest subsidiary bank), we compute the average loan per insider in Q4/2007 and interpret higher levels of this insider lending measure as positively correlated with the private benefits of controls. We, therefore, test a crucial implication of the dilution reluctance view: BHCs with greater insider ownership and more insider lending will be especially reluctant to sell common stock following the onset of the GFC.

The second indicator of the private benefits of control—bank opacity—measures the degree to which bank insiders can exploit their control of the bank to extract private benefits. Under the assumption that our measure of BHC opacity is positively correlated with the ability of insiders to extract private benefits from controlling the BHC, we evaluate a second implication of the dilution reluctance view: more opaque BHCs will be more reluctant to sell common stock following the onset of the GFC than otherwise similar but more transparent BHCs.

To measure bank opacity, researchers compare banks' observed loan loss provisions (LLPs) with predicted LLPs from accounting models (e.g., Dechow, Ge, and Schrand, 2010). These “abnormal” accruals of LLPs indicate greater earnings management and opacity. We construct abnormal loan loss provision accruals using a two-step procedure (e.g., Jiang, Levine, and Lin, 2016). First, we regress LLP_{bjt} for bank b in state j in quarter t on a set of determinants that past research finds explains LLPs. In this way, we separate the systemic component explained by these determinants from the unexplained part of LLPs. Following the literature, we condition on the following determinants: (1) $dNPA_{bjt}$, the change in nonperforming assets between quarter t and $t-1$, divided by total loans in quarter $t-1$ for BHC b in state j , (2) $dNPA_{bjt+1}$

and $dNPA_{bjt-1}$ because banks might use forward-looking information and past data on NPAs in selecting LLPs, (3) $SIZE_{bjt-1}$, the natural logarithm of total assets in quarter $t-1$, because official and private oversight might vary with bank size, (4) $dLOAN_{bjt}$, the change in total loans as a share of total assets, to control for the possibility that an increase in loans is associated with decreased loan quality, (5) three state characteristics that might influence LLPs: the House Price Index (HPI_{jt}), provided by the Federal Housing Finance Agency, the change in gross state product ($dGSP_{jt}$), and the change in the state's unemployment rate ($dUNEMP_{jt}$), and (6) state and quarter fixed effects, δ_j/δ_t to account for general time-varying effects on LLPs and any time-invariant state characteristics shaping LLPs.

In the second step, we take the natural logarithm of the absolute values of the errors from this regression. The errors represent the “abnormal” accrual of LLPs—the component of LLPs unexplained by the regression’s fundamental determinants. The absolute value of the residuals reflect discretionary manipulation of LLPs above and beyond that accounted for by the fundamental determinants. For each BHC, we then compute the average of the natural logarithm of the absolute values of the errors and consider a BHC with a larger average value to be more opaque than other BHCs.

We split our sample based on the median value of insider lending and bank opacity and re-estimate the “complete set of controls” regression model used in Table 4. Table 5 reports regression results, where we split the sample into banks with low (high) dilution reluctance due to their level of insider lending (Panel A) or bank opacity (Panel B).

Table 5 findings are consistent with the dilution reluctance view: Stock sales are smaller following the onset of the GFC among BHCs in which insiders enjoy greater private benefits of control, as measured by insider lending or opacity. We find that the impact of insider ownership on common stock sales is negative and statistically significant only among higher insider lending and relatively opaque BHCs, as shown in Panels A and B (columns 1 and 4).

Furthermore, these differences between low and high insider lending BHCs and between low and high opacity BHCs are statistically significant, as shown in column 7.

7. Ownership and the Sale of Common Stock: Instrumental Variables

The OLS regression results show a negative and statistically significant relationship between the share of bank equity owned by insiders and the sale of common stock following the onset of the GFC. When controlling for time-varying BHC characteristics and BHC- and time-fixed effects, these results hold. Furthermore, consistent with the dilution reluctance view, we find smaller common stock sales among BHCs with more substantial private benefits of control, as proxied by insider lending and opacity, following the start of the GFC.

Nevertheless, identification concerns remain. For example, unobserved differences in the ability of inside and outside investors to monitor bank managers could simultaneously influence *Insider ownership* and the BHC's willingness and ability to sell common stock. This section addresses this concern using an instrumental variable based on interstate bank and branch deregulation.

7.1. Instrumental variable (IV)

7.1.1 Broad strategy

Our strategy for building an instrumental variable for *Insider Ownership* rests on four building blocks. First, when regulatory authorities removed impediments to the geographic expansion of banks, banks expanded (e.g., Goetz, Laeven, and Levine, 2013, 2016; Rice and Strahan, 2010). Second, it took years for banks to enter new markets after regulatory authorities removed impediments to geographic expansions (e.g., Goetz, Laeven, and Levine, 2013, 2016). Third, the degree to which BHCs expanded into new banking markets was negatively correlated with the geographic distance to those markets (e.g., Goetz, Laeven, and Levine, 2013, 2016). Fourth, we assume that when BHCs expanded geographically by acquiring existing or establishing new subsidiary banks or branches, they often raised equity capital. To

the extent that inside owners are disinclined or unable to reallocate wealth from their other investments into bank equity, geographic expansion will involve raising capital from “outsiders,” reducing *Insider Ownership*. Thus, we use detailed information on the deregulation of geographic impediments to a BHC’s expansion as an exogenous source of variation in the BHC’s *Insider Ownership*.

7.1.2. Our instrument and first-stage results

Our strategy requires information on (1) exogenous sources of variation in regulatory impediments to each BHC expanding into each banking market across the United States, (2) the number of years during which each BHC could expand into those markets, and (3) the distance between each BHC and those banking markets. We combine this information to measure each BHC’s potential for expanding geographically. We use this measure as an instrumental variable for *Insider Ownership* under the assumption that geographic expansion requires capital, some of which will likely come from outside investors. We test this assumption below.

We exploit changes to interstate banking as exogenous sources of variation in impediments to BHCs expanding into other states in the continental United States. Concerning interstate banking, regulations prohibited BHCs from establishing subsidiary banks in different states until 1982. Then, states gradually lowered these barriers to interstate banking through unilateral, bilateral, and multilateral agreements. The process of deregulation was chaotic, with considerable cross-state and cross-time variation. For example, State B might permit BHCs from State A to enter in 1990, but State B might permit BHCs from State C to enter only in 1993. Thus, for each pair of states i and j , there is a year when banks from i could establish subsidiaries in j and a potentially different year when banks from j could form subsidiaries in i . The Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 removed all remaining state barriers to interstate banking.

Based on this history of interstate bank deregulation, we first compute *Time Since Bank Deregulation_{b,s}* as the number of years (as of 2008) that BHC *b* could establish subsidiaries in state *s*. For example, suppose BHCs headquartered in BHC's *b* state could establish subsidiaries in state *s* in 1990. In that case, *Time Since Bank Deregulation_{b,s}* equals 18. An extensive body of research reviewed by Goetz, Laeven, and Levine (2013) uses interstate bank deregulation as an exogenous shock to the ability of BHCs to expand. These papers further document that the decision of BHCs to expand into other states is stronger if that state is also geographically close. We build on this and further distinguish whether state *s* neighbors BHC *b*'s home state or not. Our instrumental variable is, therefore, the natural logarithm of the average number of years since BHCs were permitted to enter neighboring states ($\ln(\text{Average time since deregulation (neighboring states)})$).

The first-stage regression results indicate that our instrumental variable is closely associated with *Insider Ownership*. As shown in Panel B of Table 6, $\ln(\text{Average time since deregulation (neighboring states)})$ enters negatively and significantly in the first-stage regression, where the dependent variable is *Insider Ownership* in 2008. The F-test rejects the hypothesis that the excluded instrument does not account for cross-BHC variation in *Insider Ownership*. This finding is consistent with the view that exogenous increases in BHC expansion spur BHCs to raise equity from investors other than insiders, reducing insider ownership.

7.2. IV Results

Table 6 provides the instrumental variable results. Panel A gives the second-stage results, Panel B the first-stage results, and Panel C shows the reduced-form findings. The dependent variables in the second-stage and reduced-form analyses are the three components of changes in total equity capital: *sale of common stock / Total equity capital (Q1/2007)*, *Sale*

of preferred stock / Total equity capital (Q1/2007), and Addition to retained earnings / Total equity capital (Q1/2007), respectively.

The IV results confirm the OLS findings on common and preferred stock: BHCs with more insider ownership sell less common and preferred stock from Q3/2008 through Q4/2010 than otherwise similar BHCs with less insider ownership. The IV analyses yield estimated coefficients on *Insider Ownership* about five times larger than the OLS estimates. This can arise because the IV (a) provides local average treatment effects captured by the instrument, while OLS yields average treatment effects for the entire sample, or (b) reduces the effects of omitted variables or measurement errors, biasing the OLS estimates toward zero. The OLS-IV differences can also arise due to weak instruments, but the first stage is strong. We interpret the IV findings as confirming the broad message that greater insider ownership reduced stock sales following the start of the GFC, while remaining cautious about the effect size.¹⁰

The IV findings in Table 6 also indicate that BHCs with higher insider ownership increase retained earnings following the onset of the GFC more than otherwise similar BHCs with lower insider ownership. Table 6 findings are consistent with the view that high insider ownership banks were reluctant to reduce control rights by selling shares and instead retained more earnings to recapitalize following the severe adverse shock of the GFC.

8. Conclusion

We construct a unique panel dataset on the ownership structure of U.S. BHCs to (1) document the evolution of insider ownership from 2003 through 2014, and its relationship with BHC equity and (2) assess the influence of insider ownership on BHCs' stock sales following the onset of the GFC. Regarding the evolution of insider ownership, we find that it is notably stable. Average insider ownership fell slightly from 33% in 2003 to 28% in 2014. However,

¹⁰ We also repeated the analyses from Tables 4 (subsample analyses) and 5 (differentiating by private benefits of control) using IVs and confirmed the OLS findings, as shown in Appendix Tables A5 and A6.

there is no appreciable change around the GFC; most annual changes are zero or close to zero. Concerning the connection between insider ownership and BHC equity, we find a strong negative relationship between insider ownership and the fraction of common stock in total equity capital. Turning to the impact of insider ownership on stock sales in response to the GFC, we find evidence consistent with the dilution reluctance view: Following the GFC, BHCs with more insider ownership sell less common stock.

To provide more evidence on the dilution reluctance channel, we explore whether BHCs, where insiders enjoy greater control benefits, are less likely to issue common stock after the GFC. We find that insider ownership has a more powerful negative effect on the sale of common stock when banks are characterized by (a) larger insider lending or (b) greater opacity. This pattern is consistent with the dilution reluctance view, as insider lending and bank opacity are positively associated with private benefits of control for insiders. Finally, we implement an instrumental variable analysis, based on the removal of geographical expansion restrictions for U.S. BHCs, to address concerns that BHCs with different insider ownership levels may have been differently exposed to the GFC shock. Our IV results confirm that insider ownership reduces common stock issuances.

This finding suggests that the private benefits of control associated with insider ownership shape capital raisings at U.S. BHCs. Our results highlight an important channel through which ownership structure affects bank capital buffers and, hence, banks' resilience and stability. These results highlight the importance of examining the ownership structure—not just the quantity of capital—when assessing bank capital adequacy.

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Figure 1: Sample coverage

The figures below plot the coverage of banks in our sample with nonmissing information on insider ownership in all banks filing FR Y-9C reports for every year. Bars represent for every year the total assets of all FR Y-9C filers. The magenta portion represents the total assets of banks that are (a) no stock corporation or (b) have a higher holder; the orange portion represents total assets of banks that only report until 2005; the red portion represents total assets of banks where insider ownership information is not available; the black portion represents total assets of banks with nonmissing information on insider ownership in that year.

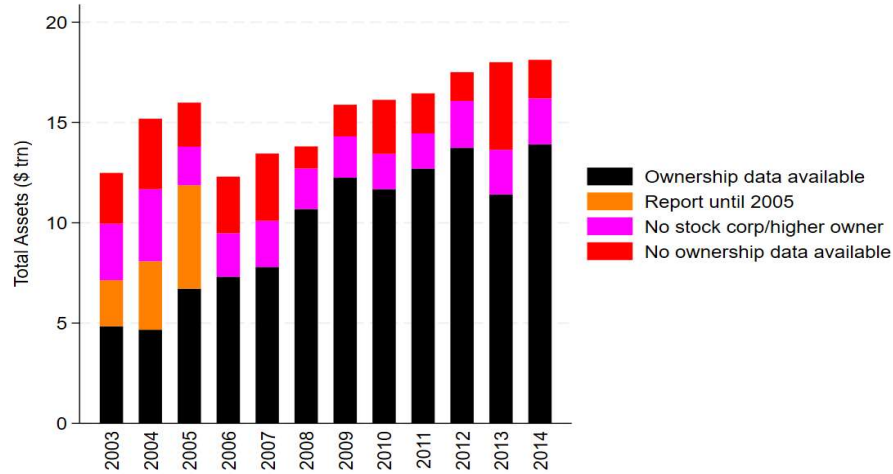
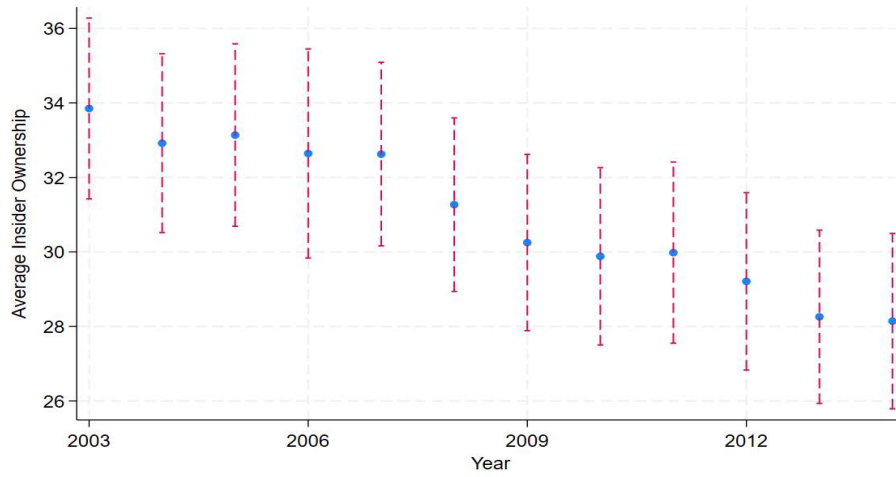


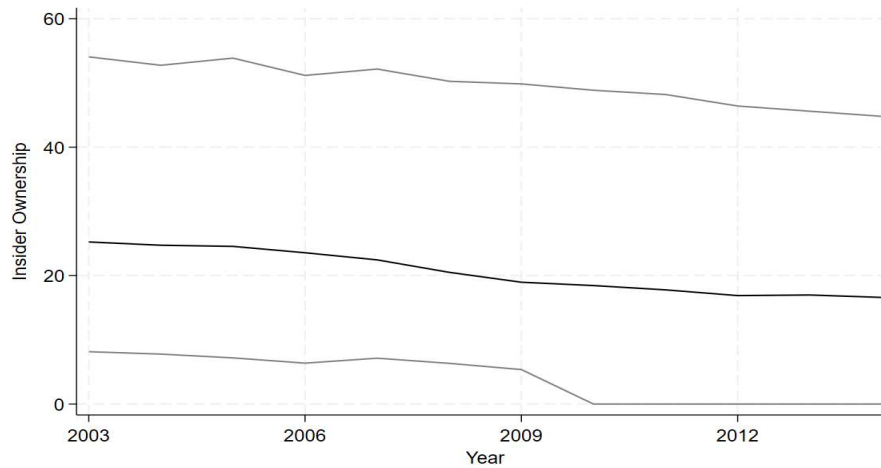
Figure 2: Level and change of insider ownership

The figures below plot time series properties of insider ownership (%) over the sample period. Panel A reports the average insider ownership (%) across BHCs for BHCs with nonmissing information on insider ownership at least in 2003 and 2014; Panel B represents a histogram of the annual change in insider ownership (%-points) over the sample period; Panel C reports the median (black line) and 25th and 75th percentile of insider ownership (%) over the sample period.

Panel A: Average Insider Ownership (%)



Panel B: Distribution of insider ownership (%)



Panel C: Histogram of annual change of insider ownership (%-points)

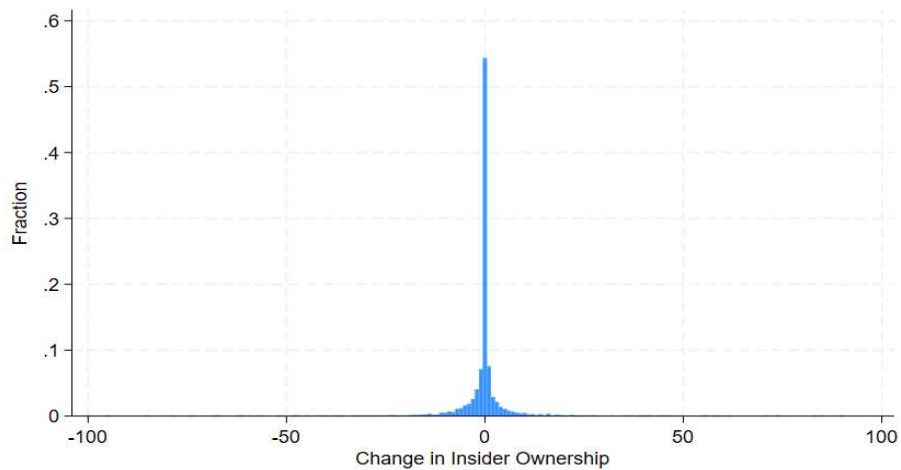


Figure 3: Distribution and change of insider ownership

The figure plots the relationship between a BHC's insider ownership (%) at the first year of observation (x-axis) and the BHC's insider ownership at the end of the BHC's sample observation (y-axis). The sample consists of all BHCs with nonmissing information on insider ownership from 2003 until 2014. We compute 50 bins based on BHCs' initial insider ownership (%) and compute the average insider ownership (%) at the end for each bin. Circles then represent the relationship between average end insider ownership (%) and average initial insider ownership (%) for each BHC in our sample. The dashed line represents the 45 degree line.

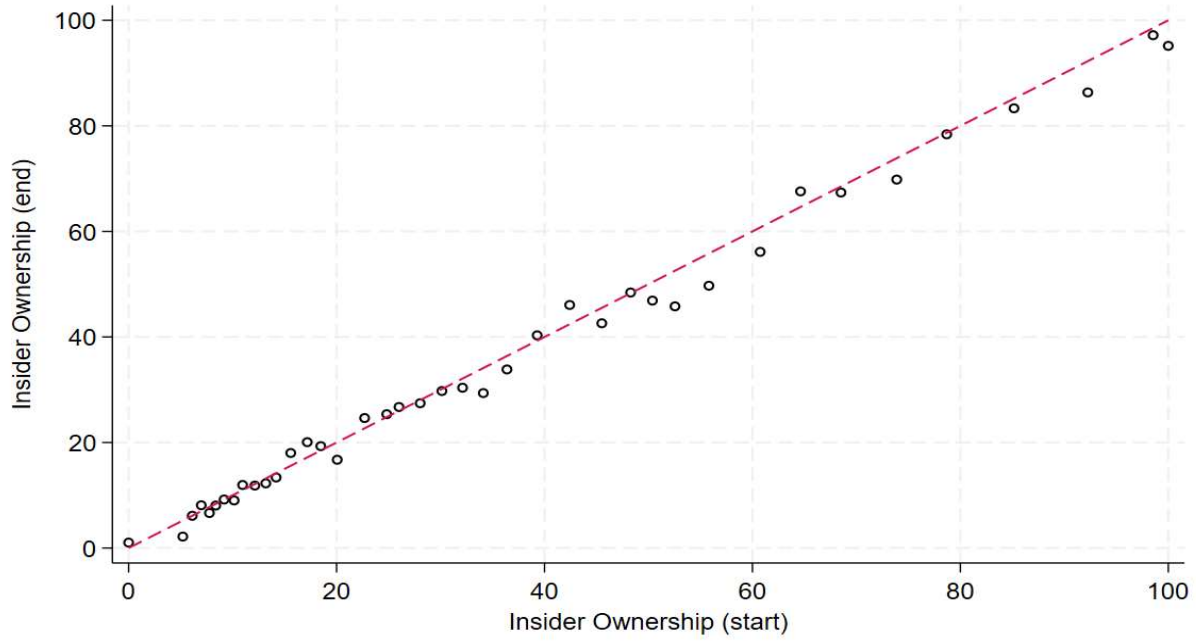


Figure 4: Insider ownership and the sale of common stock, preferred stock, retained earnings and income from Q1/2007 to Q4/2010

The figures below depict the relationship between Insider ownership and the dependent variable from Q1/2007 to Q4/2010. Bars in the top figure are coefficient estimates obtained from a bank and time fixed effects regression of the dependent variable on a set of dummy variables for each quarters and their interaction with insider ownership in 2008. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. The coefficient in Q1/2007 is dropped due to collinearity and all coefficient estimates are relative to Q1/2007. Bars with solid colors indicate that the coefficient is significant at the 5% level. Dots in the bottom figure are the cumulative effect, i.e. the sum of the coefficients on the interaction between insider ownership and the time dummies for each quarter. Dashed line represents the 95% confidence interval. All regressions include control 'log(Total Assets)'; 'Total equity capital / Total assets'; 'Other earning assets / Total assets'; 'Total deposits / Total assets'; 'Credit / Total assets', '=1 if BHC acquires subsidiary bank' and '=1 if BHC sells subsidiary bank', '=1 if large trading revenues'; '=1 if large real estate charge-offs'; '=1 if sale of common stock in the previous year' and interaction of these control variables with quarterly time dummies. Standard errors are clustered at the BHC and quarterly level.

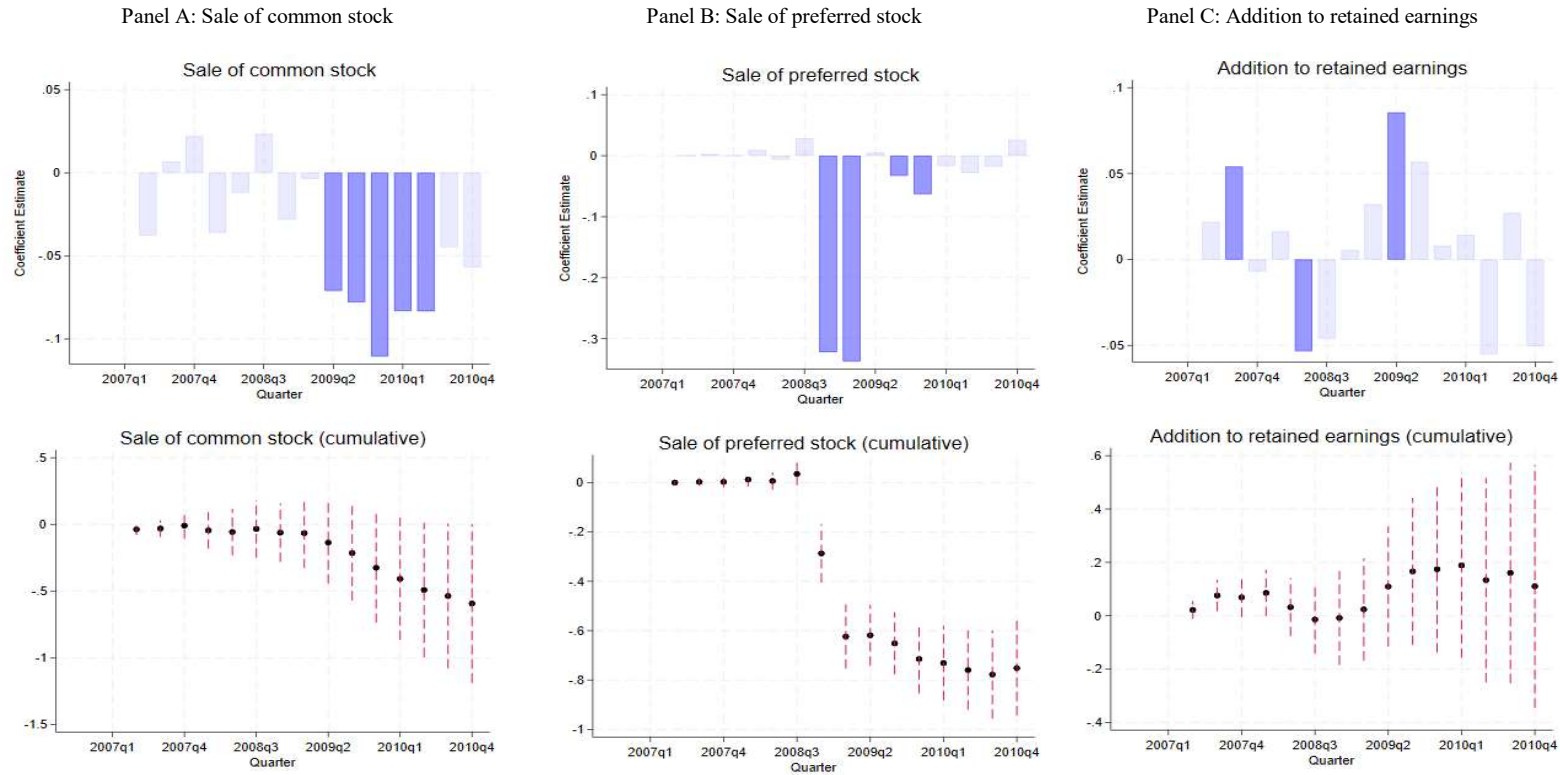


Table 1: Summary statistics

This table reports average values of insider ownership and the annual change in insider ownership at the BHC level of the years 2003 to 2014 at the BHC-year level.

Panel A: Summary statistics										
	N	Mean	St.Dev.	5th pct	25th pct	50th pct	75th pct	95th pct	Min	Max
Insider ownership (%)	7,602	30.86	31.13	0	5.67	19.76	49.92	99.13	0	100
Annual change in Insider ownership (%-points)	6,275	-0.36	7.99	-8.46	-0.6	0	0.26	6.51	-100	90.4
Common stock / Total equity capital (%)	6,740	36.51	28.15	1.63	11.83	29.95	58.46	89.05	0	99.94
Preferred stock / Total equity capital (%)	7,265	3.81	10.45	0	0	0	0	26.21	0	99.06
Retained earnings / Total equity capital (%)	6,211	60.55	28.45	9.52	37.07	66.14	85.92	97.22	0	100
Log(Total assets)	7,286	14.1	1.31	12.79	13.33	13.78	14.5	16.5	5.89	21.67
Total equity capital / Total assets (%)	7,286	9.25	2.79	5.22	7.5	9	10.69	14.07	2.91	19.97
Other earning assets / Total assets (%)	7,286	3.29	5.19	0.01	0.35	1.38	4.09	12.76	0	75.52
Total deposits / Total assets (%)	7,286	79.06	10.19	63.89	75.84	81.09	85.12	89.25	0	97.14
Credit / Total assets (%)	7,286	82.17	20.81	52.35	71.37	82.86	92.66	108.56	0	353.83

Panel B: Correlation matrix										
This table reports pairwise correlation coefficients for insider ownership and balance sheet variables over the sample period										
Variables	Insider Ownership	Annual change in Insider ownership	Common stock / Total equity capital	Preferred stock / Total equity capital	Retained earnings (Stock) / Total equity capital	Log(Total Assets)	Total equity capital / Total assets	Other earning assets / Total assets	Total deposits / Total Assets	Credit / Total Assets
Insider Ownership	1									
Annual change in Insider ownership	0.127***	1								
Common stock / Total equity capital	-0.360***	-0.028**	1							
Preferred stock / Total equity capital	-0.101***	0.01	0.072***	1						
Retained earnings / Total equity capital	0.319***	0.021	-0.918***	-0.236***	1					
Log(Total Assets)	-0.265***	-0.001	0.148***	0.097***	-0.135***	1				
Total equity capital / Total assets	-0.105***	-0.016	0.056***	-0.061***	-0.082***	0.162***	1			
Other earning assets / Total assets	0.012	0.005	-0.002	0.102***	-0.007	0.135***	0.091***	1		
Total deposits / Total Assets	0.163***	-0.002	-0.118***	0	0.111***	-0.400***	-0.281***	-0.022*	1	
Credit / Total Assets	-0.066***	0.007	0.092***	-0.003	-0.080***	0.099***	-0.112***	-0.200***	0.044***	1

Table 2: Insider ownership and the stock of equity components

This table reports results from an OLS regression at the BHC-year level over the years 2003 to 2014. The dependent variable in column (1) and (2) is the share of common stock and surplus in total bank equity; the dependent variable in column (3) and (4) is the share of preferred stock in total bank equity and the dependent variable in columns (5) and (6) is the share of retained earnings in bank equity. 'Insider ownership' is the share of insider ownership in year t . 'ln(Total Assets)' is the natural logarithm of the BHC's total assets; 'Deposits / Assets' is the BHC's total deposits, scaled by total assets; 'Equity / Assets' is the BHC's total equity, scaled by assets; 'Other Earning Assets / Assets' is the BHC's total other earning assets, scaled by total assets; 'Credit Assets' is the BHC's total loans and unused commitments, scaled by total assets. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. Regression models include BHC and year fixed effects. Standard errors are clustered at the BHC level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Common stock		Preferred stock		Retained earnings	
	Total equity capital		Total equity capital		Total equity capital	
Insider Ownership	-0.103*** (0.032)	-0.112*** (0.032)	0.040 (0.044)	0.030 (0.045)	0.088*** (0.034)	0.084** (0.034)
Log(Total assets)		-0.0765 (0.083)		-0.0794 (0.106)		-0.105 (0.068)
Total equity capital / Total assets		-1.595* (0.844)		-0.541 (1.987)		-3.564*** (0.878)
Other earning assets / Total assets		0.240 (0.278)		0.602 (0.503)		-0.137 (0.284)
Total deposits / Total assets		0.933*** (0.298)		0.818** (0.401)		-0.821*** (0.243)
Credit / Total Assets		-0.130 (0.117)		-0.352** (0.160)		0.317** (0.161)
BHC fixed effects	x	x	x	x	x	x
Year fixed effects	x	x	x	x	x	x
Observations	6714	6714	7269	7269	6188	6188

Table 3: Insider ownership and contributions to bank equity over the period Q1/2007 to Q4/2010

This table reports results from an OLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010. The dependent variable in column (1) to (3) is the sale of common stock in a quarter relative to total equity capital in Q1/2007; the dependent variable in columns (4) to (6) is the sale of preferred stock in a quarter relative to total equity capital in Q1/2007; the dependent variable in columns (7) and (9) is addition to retained earnings in a quarter relative to total equity capital in Q1/2007. 'Insider ownership' is the share of insider ownership in 2008. 'log(Total Assets)' is the natural logarithm of the BHC's total assets; 'Total equity capital / Total assets' is the BHC's total equity capital, scaled by total assets; 'Other earning assets / Total assets' is the BHC's other earning assets, scaled by total assets; 'Total deposits / Total assets' is the BHC's total deposits, scaled by total assets; 'Credit / Total assets' is the BHC's total loans and unused commitments, scaled by total assets; '=1 if BHC acquires/sells subsidiary bank' is an indicator variable, taking on the value of one whether the BHC acquires/sells a subsidiary bank in that quarter; '=1 if large trading revenues' is an indicator taking on the value of one whether the BHC's share of trading revenue in net income over the previous four quarters is larger than 15%; '=1 if large real estate charge-offs' is an indicator variable, taking on the value of one whether the BHC reports any real estate charge-offs in the previous four quarters; '=1 if sale of common stock in the previous year' is an indicator variable, taking on the value of one whether the BHC sold common stock in the previous four quarters. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. Regression models include BHC and quarter fixed effects. Standard errors are clustered at the BHC and quarterly level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sale of common stock			Sale of preferred stock			Addition to retained earnings		
	Total equity capital (Q1/2007)			Total equity capital (Q1/2007)			Total equity capital (Q1/2007)		
Insider Ownership * (=1 if after Q3/2008)	-0.099*** (0.023)	-0.057*** (0.019)	-0.060*** (0.018)	-0.116 (0.071)	-0.092* (0.047)	-0.097* (0.049)	0.025 (0.029)	0.041 (0.027)	0.020 (0.027)
Log(Total Assets)		0.302** (0.131)	0.258* (0.137)		0.139 (0.100)	0.166 (0.106)		0.223 (0.235)	0.190 (0.233)
Total equity capital / Total assets		0.073*** (0.021)	0.074*** (0.021)		0.065* (0.032)	0.068* (0.034)		0.071* (0.036)	0.073* (0.036)
Other earning assets / Total assets		0.002 (0.004)	0.001 (0.004)		-0.004 (0.008)	-0.004 (0.007)		-0.004 (0.006)	-0.004 (0.006)
Total deposits / Total assets		0.011 (0.009)	0.011 (0.009)		-0.001 (0.005)	-0.002 (0.005)	-0.032*** (0.011)	-0.027** (0.011)	
Credit / Total Assets		-0.003 (0.002)	-0.003 (0.002)		-0.004 (0.002)	-0.004 (0.003)	0.003 (0.003)	0.003 (0.003)	
=1 if BHC acquires subsidiary bank			0.401* (0.192)			-0.091* (0.044)			0.106** (0.037)
=1 if BHC sells subsidiary bank			-0.444** (0.207)			0.170** (0.073)			-0.196** (0.085)
=1 if large trading revenue			-0.113 (0.153)			0.118 (0.119)			-0.036 (0.160)
=1 if large real estate charge-offs			0.012 (0.048)			-0.050 (0.047)			-0.040 (0.058)
=1 if sale of common stock in previous year			-0.074* (0.039)			-0.136 (0.088)			0.136** (0.054)
BHC fixed effects	x	x	x	x	x	x	x	x	x
Quarter fixed effects	x	x	x	x	x	x	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x	x	x	x	x	x	x
Observations	10480	10480	10450	10480	10480	10450	10480	10480	10450

Table 4: The effect of insider ownership on contributions to bank equity over the period Q1/2007 to Q4/2010 - Robustness: Subsamples

This table reports results from an OLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010 for different subsamples. The dependent variable in column (1) is the sale of common stock in a quarter relative to total equity capital in Q1/2007; the dependent variable in column (2) is the sale of preferred stock in a quarter relative to total equity capital in Q1/2007; the dependent variables in column (3) is retained income in a quarter relative to total equity capital in Q1/2007. 'Insider ownership' is the share of insider ownership in year t. The sample in Panel A excludes BHCs that were subject to the Supervisory Capital Assessment Program in 2009; the sample in Panel B excludes BHCs organized as S-Corporations; the sample in Panel C excludes banks with assets above \$500 billion of assets. Regression models include all control variables and BHC and quarter fixed effects. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. Standard errors are clustered at the BHC and quarterly level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)
	Sale of common Stock	Sale of preferred stock	Addition to retained earnings
	Total equity capital (Q1/2007)		
Panel A: Exclude SCAP Banks			
Insider Ownership * (=1 if after Q3/2008)	-0.060** (0.018)	-0.093 (0.047)	0.018 (0.027)
Observations	10290	10290	10290
Panel B: Exclude S-Corporations			
Insider Ownership * (=1 if after Q3/2008)	-0.048* (0.018)	-0.093 (0.048)	0.029 (0.028)
Observations	9333	9333	9333
Panel C: Exclude banks with assets above 5 bn \$			
Insider Ownership * (=1 if after Q3/2008)	-0.060* (0.021)	-0.082 (0.045)	-0.033 (0.046)
Observations	8311	8311	8311
Control variables			
Log(Total assets)	x	x	x
Total equity capital / Total assets	x	x	x
Other earning assets / Total assets	x	x	x
Total deposits / Total assets	x	x	x
Credit / Total Assets	x	x	x
=1 if BHC acquires subsidiary bank	x	x	x
=1 if BHC sells subsidiary bank	x	x	x
=1 if large trading revenue	x	x	x
=1 if large real estate charge-offs	x	x	x
=1 if sale of common stock in previous year	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x
BHC fixed effects	x	x	x
Quarter fixed effects	x	x	x

Table 5: The effect of insider ownership on contributions to bank equity over the period Q1/2007 to Q4/2010 - Heterogenous private benefits of control

This table reports results from an OLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010 for different subsamples. The dependent variable in column (1), (4) and (7) is the sale of common stock in a quarter relative to total equity capital in Q1/2007; the dependent variable in columns (2), (5) and (8) is the sale of preferred stock in a quarter relative to total equity capital in Q1/2007; the dependent variables in columns (3), (6) and (9) is addition to retained earnings in a quarters relative to total equity capital in Q1/2007. The analysis in Panel A splits the sample between banks with high/low insider lending. The analysis in Panel B splits the sample between banks with a high, i.e. above sample median, level of loan opacity. Coefficients in columns (7) to (9) reports the differential effect of insider ownership for the aforementioned sample splits where we interact all control variables and quarter fixed effects with a dummy variable taking on the value of one whether the BHC has high insider lending (Panel A) or is opaque (Panel B). Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. Regression models include all control variables, BHC and quarter fixed effects. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Standard errors in regression models (1) to (6)/(7) to (9) are clustered at the BHC and quarterly/Sample-split-quarterly level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sale of common stock	Sale of preferred stock	Addition to retained earnings	Sale of common stock	Sale of preferred stock	Addition to retained earnings	Sale of common stock	Sale of preferred stock	Addition to retained earnings
	Total equity capital (Q1/2007)			Total equity capital (Q1/2007)			Total equity capital (Q1/2007)		
Panel A: Insider Lending									
	Low (a)			High (b)			Differential effect [(b) - (a)]		
Insider Ownership * (=1 if after Q4/2008)	-0.030 (0.023)	-0.086** (0.040)	-0.015 (0.038)	-0.100*** (0.032)	-0.103* (0.056)	0.053 (0.036)	-0.071** (0.032)	-0.016 (0.056)	0.068* (0.036)
Observations	5072	5072	5072	5308	5308	5308	10380	10380	10380
Panel B: Opacity									
	Low (a)			High (b)			Differential effect [(b) - (a)]		
Insider Ownership * (=1 if after Q4/2008)	-0.031 (0.026)	-0.089** (0.038)	0.057** (0.026)	-0.080*** (0.026)	-0.101 (0.058)	-0.006 (0.041)	-0.049* (0.028)	-0.012 (0.059)	-0.063 (0.040)
Observations	5016	5016	5016	5434	5434	5434	10450	10450	10450
Log(Total assets)	x	x	x	x	x	x	x	x	x
Total equity capital / Total assets	x	x	x	x	x	x	x	x	x
Other earning assets / Total assets	x	x	x	x	x	x	x	x	x
Total deposits / Total assets	x	x	x	x	x	x	x	x	x
Credit / Total Assets	x	x	x	x	x	x	x	x	x
=1 if BHC acquires subsidiary bank	x	x	x	x	x	x	x	x	x
=1 if BHC sells subsidiary bank	x	x	x	x	x	x	x	x	x
=1 if large trading revenue	x	x	x	x	x	x	x	x	x
=1 if large real estate charge-offs	x	x	x	x	x	x	x	x	x
=1 if sale of common stock in previous yr	x	x	x	x	x	x	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x	x	x	x	x	x	x
BHC fixed effects	x	x	x	x	x	x	x	x	x
Quarter fixed effects	x	x	x	x	x	x			
High insider lending/opacity * Control var.							x	x	x
High insider lending/opacity * quarter FE							x	x	x

Table 6: The effect of insider ownership on contributions to bank equity over the period Q1/2007 to Q4/2010 - 2SLS

This table reports results from a 2SLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010. The dependent variable in column (1) is the sale of common stock in a quarter relative to total equity capital in Q1/2007; the dependent variable in column (2) is the sale of preferred stock in a quarter relative to total equity capital in Q1/2007; the dependent variables in column (3) is retained income in a quarter relative to total equity capital in Q1/2007. 'Insider ownership' is the share of insider ownership in 2008. The excluded instrumental variable is the natural logarithm of the average number of years since neighboring states removed their entry restrictions for banks located in the BHC's headquarters state. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. Regression models include all control variables, BHC and quarter fixed effects. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Standard errors are clustered at the BHC and quarterly level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)
	Sale of common Stock	Sale of preferred stock	Addition to retained earnings
	Total equity capital (Q1/2007)	Total equity capital (Q1/2007)	Total equity capital (Q1/2007)
Panel A: Second stage			
Insider Ownership * (=1 if after Q3/2008)	-0.257** (0.099)	-0.352* (0.167)	0.463*** (0.140)
Panel B: First stage			
Ln(Average Time since deregulation (neighboring states)) * (=1 if after Q3/2008)	-0.232*** (0.037)	-0.232*** (0.037)	-0.232*** (0.037)
Panel C: Reduced form			
Ln(Average Time since deregulation (neighboring states)) * (=1 if after Q3/2008)	0.060** (0.021)	0.082* (0.039)	-0.107*** (0.028)
<i>Control variables</i>			
Log(Total assets)	x	x	x
Total equity capital / Total assets	x	x	x
Other earning assets / Total assets	x	x	x
Total deposits / Total assets	x	x	x
Credit / Total Assets	x	x	x
=1 if BHC acquires subsidiary bank	x	x	x
=1 if BHC sells subsidiary bank	x	x	x
=1 if large trading revenue	x	x	x
=1 if large real estate charge-offs	x	x	x
=1 if sale of common stock in previous year	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x
BHC fixed effects	x	x	x
Quarter fixed effects	x	x	x
F-Test (first stage)	10.910	10.910	10.910
Observations	10402	10402	10402

Appendix Figure A1: Sample FR-Y6 report

This table displays a sample report item 4 of a FR-Y6 report for a BHC in our sample.

INFORMATION FOR ANNUAL REPORT FORM FR Y-6

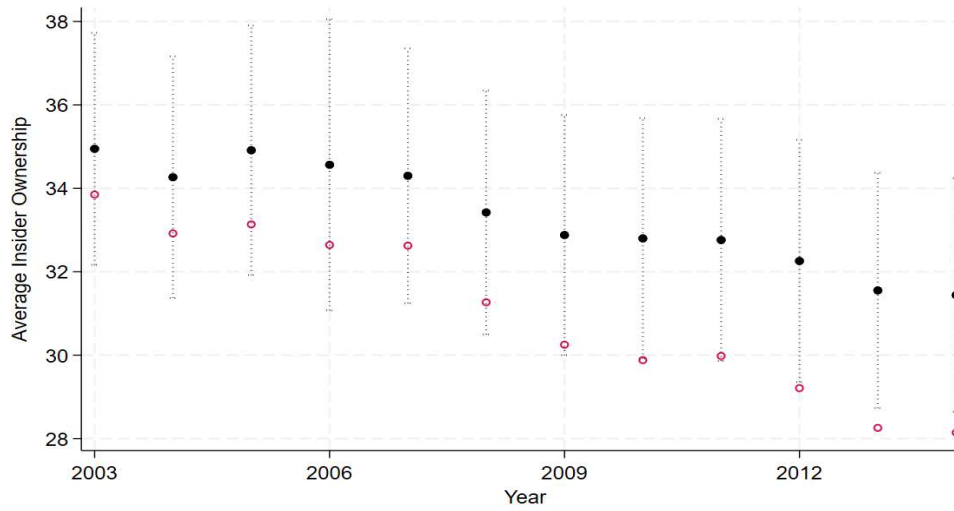
Report
Item 4) Insiders

(1)	(2)	(3) Title or Position	(4) Share Ownership
Name and Address	Principal Occupation	a) Bank Holding Company b) Subsidiary c) Other Businesses	a) Bank Holding Company b) Subsidiary c) Other Businesses
Quentin Beadell Mankato, MN/USA	Banker	a) President/Director b) President/Director (Community Bank Mankato) c) President/Director (Beadell Agency, Inc.)	a) 2,303/56.13% b) None c) 1,000/33.3%
Carolyn Beadell Mankato, MN/USA	Housewife	a) Vice President/Director b) Vice President/Director (Community Bank Mankato) c) Director (Beadell Agency, Inc.)	a) 408/9.94% b) None c) 600/20%
Mark Beadell Mankato, MN/USA	Banker	a) Secretary/Treasurer/Director b) Vice President/Director (Community Bank Mankato) c) None (Beadell Agency, Inc.)	a) 220/5.36% b) None c) 700/23.3%
Cheryl Kietzer Mankato, MN/USA	Secretary	a) Director b) None c) None (Beadell Agency, Inc.)	a) 527/12.84% b) None c) 700/23.3%

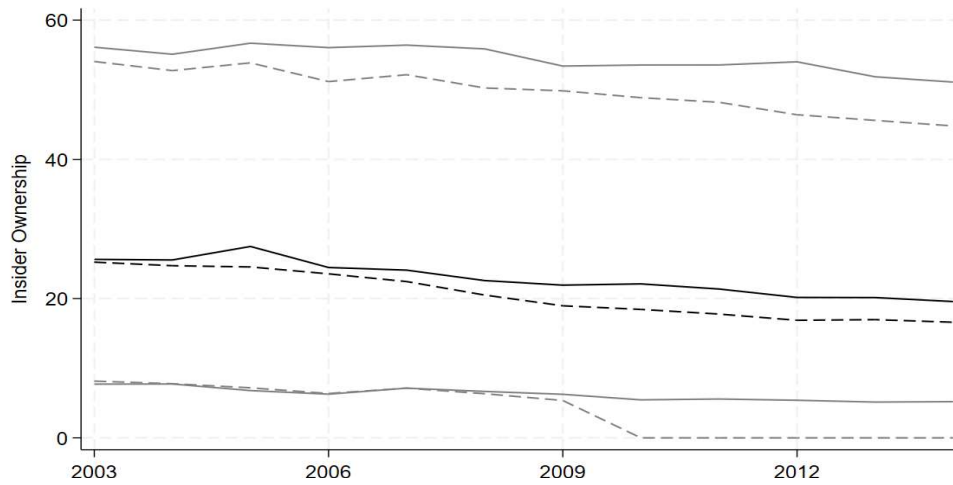
Appendix Figure A2: Level and change of insider ownership

The figures below plot time series properties of insider ownership over the sample period. The sample consists of BHCs that do not exit the sample and have nonmissing information on insider ownership at the beginning of the sample (2003) and end (2014). Panel A reports the average insider ownership across BHCs for BHCs with nonmissing information on insider ownership at least in 2003 and 2014. Hollow dots represent the average insider ownership for the full sample as reported in Figure 2. Panel B reports the median (black line) and 25th and 75th percentile of insider ownership over the sample period. Dashed lines represent the percentiles for the whole sample as in Panel C of Figure 2.

Panel A: Average Insider Ownership

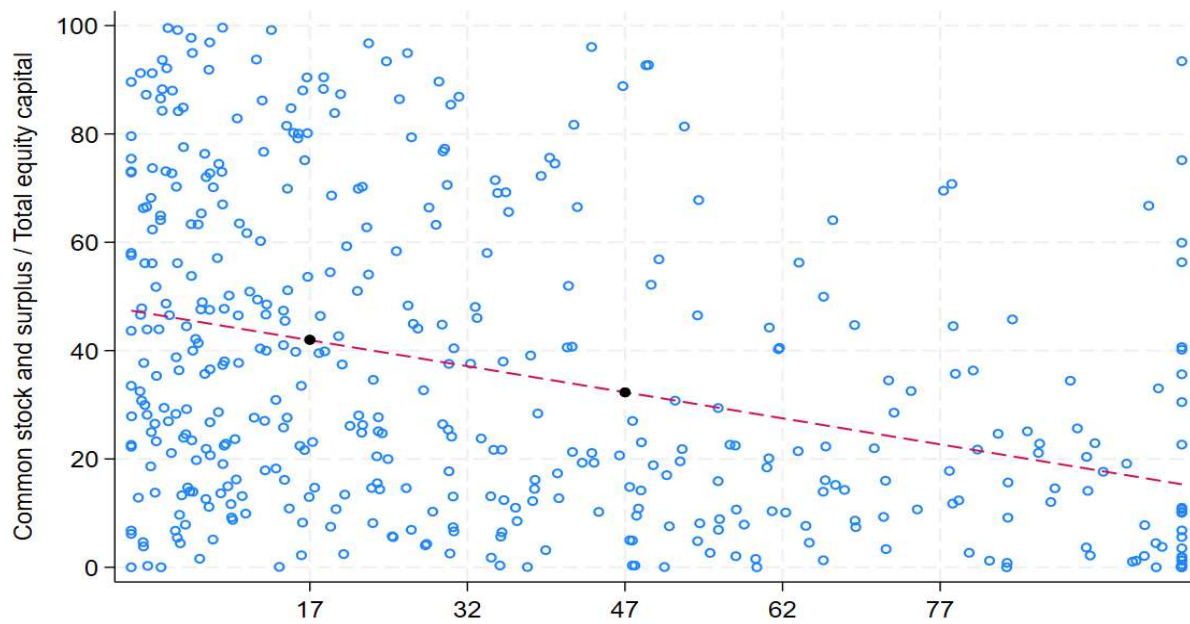


Panel B: Distribution of insider ownership



Appendix Figure A3: Common stock and surplus and insider ownership in 2008

The scatter plot represents the association between insider ownership (x- axis) and common stock and surplus, scaled by total equity capital in 2008. Each hollow blue dot represent the values of Insider ownership and Common stock and Surplus, scaled by Total equity capital for a BHC in our sample; the dashed line represents the linear fit obtained by an OLS regression.



Appendix Table A1: Sample composition (Number of banks)

This table reports for every year the selection of banks in our sample. The table reports for every year the number of banks that (a) file FR Y-9C reports, (b) the number of banks that are not registered as a stock corporation and/or have a higher holder, (c) the number of banks that could not be merged to SNL Financial, (d) the number of banks with missing insider information, (e) the number of banks that have information on insider ownership and are not exiting the sample until 2018 and (f) the number of banks with information on insider ownership that will exit at some point during the sample period.

	(a) All FR Y-9C filers	(b) No stock corporation/higher holder	(c) Report until 2005	(d) No ownership data available	(e) Ownership data available - surviving	(f) Ownership data available - exiting
1996	1,424	129	187	1,100	5	3
1997	1,501	109	253	1,030	88	21
1998	1,589	101	340	1,042	89	17
1999	1,693	105	423	934	188	43
2000	1,770	102	495	932	192	49
2001	1,881	95	607	924	203	52
2002	2,016	92	727	909	224	64
2003	2,173	97	865	603	478	130
2004	2,287	90	1,012	578	474	133
2005	2,296	85	1,077	537	468	129
2006	976	75	0	458	339	104
2007	956	74	0	321	432	129
2008	963	81	0	256	484	142
2009	1,005	88	0	307	492	118
2010	1,003	92	0	285	503	123
2011	1,010	95	0	302	495	118
2012	1,133	124	0	387	503	119
2013	1,136	122	0	381	514	119
2014	1,122	121	0	373	516	112
2015	647	76	0	100	388	83
2016	641	84	0	233	271	53
2017	636	68	0	284	256	28
2018	368	34	0	224	104	6

Appendix Table A2: Sample composition (Size)

This table reports for every year the selection of banks in our sample. The table reports for every year the aggregate total assets (\$ bn) of banks that (a) file FR Y-9C reports, (b) the aggregate total assets (\$ bn) of banks that are not registered as a stock corporation and/or have a higher holder, (c) the aggregate total assets (\$ bn) of banks that could not be merged to SNL Financial, (d) the aggregate total assets (\$ bn) of banks with missing insider information, (e) the aggregate total assets (\$ bn) of banks that have information on insider ownership and are not exiting the sample until 2018 and (f) the aggregate total assets (\$ bn) of banks with information on insider ownership that will exit at some point during the sample period.

	(a) All FR Y-9C filers	(b) No stock corporation/higher holder	(c) Report until 2005	(d) No ownership data available	(e) Ownership data available - surviving	(f) Ownership data available - exiting
1996	5,254	808	499	3945	2	1
1997	5,836	839	655	4291	41	9
1998	7,049	993	953	4969	126	9
1999	8,325	1652	1442	4878	302	51
2000	9,345	2061	1583	5235	322	144
2001	10,365	2357	1760	5917	286	44
2002	11,119	2524	1925	5891	577	202
2003	12,487	2814	2298	2534	4560	280
2004	15,188	3592	3412	3513	4319	352
2005	15,990	1922	5160	2195	6308	406
2006	12,301	2167	0	2823	6913	398
2007	13,452	2301	0	3356	7330	465
2008	13,809	2022	0	1102	10160	525
2009	15,886	2056	0	1576	11814	440
2010	16,131	1758	0	2695	11177	501
2011	16,453	1754	0	1996	12184	519
2012	17,511	2333	0	1435	13368	375
2013	18,007	2228	0	4369	10849	562
2014	18,125	2291	0	1925	13316	593
2015	17,967	2103	0	5960	9339	565
2016	19,406	2637	0	7157	9193	418
2017	19,760	1218	0	13697	4461	384
2018	19,724	1189	0	15308	2969	258

Appendix Table A3: Bank balance sheet variable definitions

This table provides definitions and sources for bank control variables based on regulatory FR-Y9C filings

Variable	Source	Definition
Common stock	FR-Y9C	BHCK3230 + BHCK3240
Preferred stock	FR-Y9C	BHCK3238
Retained earnings (Stock)	FR-Y9C	BHCK3247
Total equity capital	FR-Y9C	BHCK3210
Total assets	FR-Y9C	BHCK2170
Other earning assets	FR-Y9C	BHCB985
Total deposits	FR-Y9C	Sum of Non-interest bearing deposits (BHDM6631) and Interest-bearing deposits (BHDM6636)
Credit	FR-Y9C	Sum of Total loans and leases, net of unearning income(BHCK2122) and Unused loan commitments (see below)
Unused loan commitments	FR-Y9C	BHCK3814 + BHCK3815 + BHCK3816 + BHCK6550 + BHCK3817 + BHCK3818 until Q4/2009 BHCK3814 + BHCKJ455 + BHCKJ456 + BHCK3816 + BHCK6550 + BHCK3817 + bBHCKJ457 + BHCKJ458 + BHCKJ459 after Q4/2009
Sale of common stock	FR-Y9C	BHCK3579 + BHCK3580
Sale of preferred stock	FR-Y9C	BHCK3577 + BHCK3578
Addition to retained earnings	FR-Y9C	BHCK4107-BHCK4073 + BHCK4079 - BHCK4093+ BHCK3196 + BHCK3521- BHCK4598-BHCK4460-BHCK4230-BHCK4783+BHCK4782
=1 if BHC acquires subsidiary bank	own calculation; FFIEC	=1 if the BHC acquires a subsidiary bank in quarter t
=1 if BHC sells subsidiary bank	own calculation; FFIEC	=1 if the BHC sells a subsidiary bank in quarter t
=1 if large trading revenue	own calculation; FR-Y9C	=1 if Trading revenue over previous 4 quarters, scaled by Net income over previous four quarters > 15%
=1 if large real estate charge-offs	own calculation; FR-Y9C	=1 if Real estate charge-offs over previous four quarters >0
=1 if sale of common stock in previous year	own calculation; FR-Y9C	=1 if bank sold common stock in the pervious four quarters

Appendix Table A4: Descriptive statistics - Quarterly

This table reports summary statistics for our analysis at the BHC-quarter level (Tables 3 to 6). 'Insider ownership (%)' is the share of stock, held by insiders in 2008, 'Sale of common stock' is the sale of common stock in a quarter, scaled by equity capital in Q1/2007, 'Sale of preferred stock' is the sale of preferred stock in a quarter, scaled by equity capital in Q1/2007, 'Retained earnings' is retained earnings in a quarter, scaled by equity capital in Q1/2007, 'ln(Total assets)' is the natural logarithm of total assets in a quarter, 'Equity / RWA' is bank equity scaled by risk weighted assets in a quarter, 'Deposits/Assets' is the share of deposits in total assets in a quarter, 'Other earning assets/Assets' is the share of other earning assets in total assets in a quarter, 'Credit / Assets' is the share of loans and unused commitments in total bank assets in a quarter, '=1 if large trading revenue' is a dummy variable if the bank has large trading revenues in a quarter, '=1 if large real estate charge-offs' is a dummy if the bank has large real estate charge-offs in a quarter, '=1 if sale of common stock in previous year' is a dummy if the bank sold common stock in the previous 4 quarters; 'ln(Average time since deregulation (neighboring states))' is the natural logarithm of the number of years since BHC is allowed to enter the neighboring states.

Panel A: Summary statistics								
	N	Mean	St.Dev.	25th pct	Median	75th pct	Min	Max
Insider ownership (2008) (%)	11,131	32	30.57	7.5	22.03	51.22	0	100
Sale of common stock (* 100)	11,497	0.61	3.24	0	0	0.11	-1.87	26.18
Sale of preferred stock (* 100)	11,497	0.64	4.07	0	0	0	-0.07	30.88
Addition to retained earnings (*100)	11,497	0.19	6.17	-0.56	1.6	3.24	-31.32	10.11
Log(Total assets)	11,950	14.16	1.27	13.4	13.8	14.52	11.17	21.59
Total equity capital / Total assets (%)	11,950	9.03	4.09	7.16	8.65	10.38	-5.49	80.92
Total deposits / Total assets (%)	11,950	77.83	10.53	74.35	79.79	84.22	0.79	96.8
Other earning assets / Total assets (%)	11,950	2.53	4.33	0.19	0.89	2.93	-0.02	75.52
Credit / Assets (%)	11,950	84.89	21.14	74.84	85.26	94.51	5.61	505.29
=1 if large trading revenue	11,744	0.02	0.15	0	0	0	0	1
=1 if large real estate charge-offs	11,745	0.93	0.25	1	1	1	0	1
=1 if sale of common stock in previous year	12,391	0.44	0.5	0	0	1	0	1
=1 if BHC sells subsidiary bank	11,996	0.03	0.17	0	0	0	0	1
=1 if BHC acquires subsidiary bank	12,391	0.06	0.24	0	0	0	0	1
Ln(Average Time since deregulation (neighboring states))	11,083	3.02	0.07	2.98	3.03	3.08	2.79	3.12

Panel B: Correlation matrix

Variables	Insider ownership (%)	Sale of common stock	Sale of preferred stock	Addition to retained earnings	Log(Total assets)	Total equity capital / Total assets (%)	Total deposits / Total assets (%)	Other earning assets / Total assets (%)	Credit / Assets (%)	=1 if large trading revenue	=1 if large real estate charge-offs	=1 if sale of common stock in previous year	=1 if BHC sells subsidiary bank	=1 if BHC acquires subsidiary bank	Ln(Average Time since deregulation (neighboring states))
Insider ownership (%)	1														
Sale of common stock	-0.068***	1													
Sale of preferred stock	-0.070***	0.055***	1												
Addition to retained earnings	0.041***	-0.073***	-0.090***	1											
Log(Total assets)	-0.265***	0.121***	0.087***	0.008	1										
Total equity capital / Total assets (%)	-0.046***	0.039***	0.036***	0.148***	0.116***	1									
Total deposits / Total assets (%)	0.194***	-0.038***	-0.063***	-0.047***	-0.450***	-0.375***	1								
Other earning assets / Total assets (%)	0.028***	0.044***	-0.003	-0.123***	0.140***	0.024**	-0.089***	1							
Credit / Assets (%)	-0.050***	0.024**	0.028***	0.015*	0.113***	-0.118***	0.006	-0.130***	1						
=1 if large trading revenue	-0.071***	0.029***	0.029***	0.041***	0.340***	0.035***	-0.192***	0.150***	-0.057***	1					
=1 if large real estate charge-offs	-0.005	0.030***	0.030***	-0.092***	0.090***	-0.096***	0.052***	0.046***	-0.017*	-0.024**	1				
=1 if sale of common stock in previous year	-0.217***	0.105***	0.030***	-0.049***	0.162***	0.024**	-0.075***	0.031***	0.090***	0.032***	-0.01	1			
=1 if BHC sells subsidiary bank	-0.053***	0.036***	0.043***	-0.011	0.281***	0.020**	-0.117***	0.056***	0.049***	0.135***	0.029***	0.038***	1		
=1 if BHC acquires subsidiary bank	-0.076***	0.102***	0.041***	0.028***	0.302***	0.048***	-0.113***	0.042***	0.034***	0.091***	0.036***	0.052***	0.673***	1	
Ln(Average Time since deregulation (neighboring states))	-0.246***	0.036***	0.037***	-0.107***	-0.001	-0.003	0.055***	-0.004	0.039***	-0.027***	-0.014	0.113***	-0.032***	-0.023**	1

Appendix Table A5: The effect of insider ownership on contributions to bank equity over the period Q1/2007 to Q4/2010 - Heterogenous private benefits of control - 2SLS

This table reports results from an 2SLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010. The dependent variable in column (1), (4) and (7) is the sale of common stock in a quarter relative to bank equity in Q1/2007; the dependent variable in columns (2),(5) and (8) is the sale of preferred stock in a quarter relative to bank equity in Q1/2007; the dependent variables in columns (3), (6) and (9) is retained income in a quarters relative to bank equity in Q1/2007. The analysis in Panel A splits the sample between banks with high/low insider lending. The analysis in Panel B splits the sample between banks with a high, i.e. above sample median, level of loan opacity. Coefficients in columns (7) to (9) reports the differential effect of insider ownership for the aforementioned sample splits. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one standard deviation change in the independent variable. Regression models include all control variables and BHC and quarter fixed effects. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Standard errors are clustered at the BHC and quarterly level in parentheses below. Standard errors in regression models (1) to (5)/((7) to (9)) are clustered at the BHC level and quarterly/sample-split-quarterly level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Sale of common stock	Sale of preferred stock	Addition to retained earnings	Sale of common stock	Sale of preferred stock	Addition to retained earnings	Sale of common stock	Sale of preferred stock	Addition to retained earnings
	Total equity capital (Q1/2007)			Total equity capital (Q1/2007)			Total equity capital (Q1/2007)		
Panel A: Insider Loan									
	Low (a)			High (b)			Differential effect [(b) - (a)]		
Insider Ownership * (=1 if after Q3/2008)	-0.052 (0.091)	-0.199** (0.087)	0.282* (0.157)	-0.445** (0.201)	-0.480* (0.238)	0.586** (0.204)	-0.393* (0.200)	-0.281 (0.237)	0.304 (0.204)
Observations	5024	5024	5024	5308	5308	5308	10332	10332	10332
Panel B: Opacity									
	Low (a)			High (b)			Differential effect [(b) - (a)]		
Insider Ownership * (=1 if after Q3/2008)	-0.111 (0.101)	-0.321** (0.131)	0.311** (0.134)	-0.373** (0.147)	-0.359* (0.196)	0.615** (0.226)	-0.262* (0.147)	-0.038 (0.196)	0.303 (0.226)
Observations	4984	4984	4984	5418	5418	5418	10402	10402	10402
Control variables									
Log(Total Assets)	x	x	x	x	x	x	x	x	x
Equity / Assets	x	x	x	x	x	x	x	x	x
Deposits / Assets	x	x	x	x	x	x	x	x	x
Other Earning Assets / Assets	x	x	x	x	x	x	x	x	x
Credit / Assets	x	x	x	x	x	x	x	x	x
=1 if BHC acquires subsidiary bank									
=1 if BHC sells subsidiary bank									
=1 if large trading revenue	x	x	x	x	x	x	x	x	x
=1 if large real estate charge-offs	x	x	x	x	x	x	x	x	x
=1 if sale of common stock in previous year	x	x	x	x	x	x	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x	x	x	x	x	x	x
BHC fixed effects	x	x	x	x	x	x	x	x	x
Quarter fixed effects	x	x	x	x	x	x	x	x	x

Appendix Table A6: The effect of insider ownership on contributions to bank equity over the period Q1/2007 to Q4/2010 - Robustness: Subsamples - 2SLS

This table reports results from an 2SLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010 for different subsamples. The dependent variable in column (1) is the sale of common stock in a quarter relative to bank equity in Q1/2007; the dependent variable in column (2) is the sale of preferred stock in a quarter relative to bank equity in Q1/2007; the dependent variables in column (3) is retained income in a quarter relative to bank equity in Q1/2007. 'Insider ownership' is the share of insider ownership in 2008. Regression models include all control variables and BHC and quarter fixed effects. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Standard errors are clustered at the BHC and quarterly level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)
	Sale of common stock	Sale of preferred stock	Addition to retained earnings
	Total equity capital (Q1/2007)	Total equity capital (Q1/2007)	Total equity capital (Q1/2007)
Panel A: Exclude SCAP Banks			
Insider Ownership * (=1 if after Q3/2008)	-0.245** (0.101)	-0.354* (0.167)	0.458*** (0.142)
F-Test (first stage)	10.881	10.881	10.881
Observations	10242	10242	10242
Panel B: Exclude S-Corporations			
Insider Ownership * (=1 if after Q3/2008)	-0.268** (0.093)	-0.317** (0.138)	0.454*** (0.144)
F-Test (first stage)	10.651	10.651	10.651
Observations	9317	9317	9317
Panel C: Exclude banks with assets above 5 bn \$			
Insider Ownership * (=1 if after Q3/2008)	-0.413* (0.209)	-0.510* (0.253)	0.777** (0.302)
F-Test (first stage)	7.531	7.531	7.531
Observations	8263	8263	8263
<i>Control variables</i>			
Log(Total assets)	x	x	x
Total equity capital / Total assets	x	x	x
Other earning assets / Total assets	x	x	x
Total deposits / Total assets	x	x	x
Credit / Total Assets	x	x	x
=1 if BHC acquires subsidiary bank	x	x	x
=1 if BHC sells subsidiary bank	x	x	x
=1 if large trading revenue	x	x	x
=1 if large real estate charge-offs	x	x	x
=1 if sale of common stock in previous year	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x
BHC fixed effects	x	x	x
Quarter fixed effects	x	x	x

Appendix Table A7: Insider ownership and acquisitions

This table reports results from an OLS regression at the BHC-quarter level over the quarters Q1/2007 to Q4/2010. The dependent variable in column (1) to (3) is a dummy variable, taking on the value of one whether the BHC acquires a subsidiary bank or branch in the quarter, or zero otherwise; the dependent variable in columns (4) to (6) is a dummy variable, taking on a value of one whether the BHC sells a subsidiary bank or branch in that quarter, or zero otherwise. 'Insider ownership' is the share of insider ownership in 2008. 'ln(Total Assets)' is the natural logarithm of the BHC's total assets; 'Deposits / Assets' is the BHC's total deposits, scaled by total assets; 'Equity / Assets' is the BHC's total equity scaled by total assets; 'Other earning assets / Assets' is the BHC's other earning assets scaled by assets; 'Credit / Assets' is the BHC's total loans + unused commitments, scaled by assets; '=1 if large trading revenues' is an indicator taking on the value of one whether the BHC has large trading revenues in that quarter; '=1 if large real estate charge-offs' is an indicator variable, taking on the value of one whether the BHC has large real estate charge-offs in that quarter. All control variables also enter the regression model with an interaction with the dummy variable, taking on the value of one whether the observation is after Q3/2008. Coefficients are multiplied by 100. Regression models include BHC and quarter fixed effects. Standard errors are clustered at the BHC level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	=1 if BHC acquires subsidiary bank/branch in quarter			=1 if BHC sells subsidiary bank/branch in quarter		
Insider Ownership * (=1 if after Q3/2008)	0.891** (0.411)	0.658 (0.523)	0.517 (0.497)	0.794*** (0.247)	0.433 (0.347)	0.291 (0.311)
Log(Total Assets)		22.736*** (3.758)	24.348*** (4.006)		4.270 (2.519)	4.504 (2.665)
Total equity capital / Total assets		0.123 (0.241)	0.026 (0.217)		-0.020 (0.125)	-0.090 (0.140)
Other earning assets / Total assets		0.267** (0.091)	0.286** (0.098)		0.124 (0.085)	0.126 (0.085)
Total deposits / Total assets		0.345 (0.304)	0.099 (0.212)		0.352 (0.264)	0.100 (0.149)
Credit / Total Assets		0.032 (0.024)	0.028 (0.030)		0.016 (0.021)	0.014 (0.021)
=1 if large trading revenue			0.887 (4.598)			7.314* (4.015)
=1 if large real estate charge-offs			-0.665 (0.608)			-0.274 (0.412)
=1 if sale of common stock in previous year			0.343 (1.216)			0.713 (0.708)
BHC fixed effects	x	x	x	x	x	x
Quarter fixed effects	x	x	x	x	x	x
Control variables * (=1 if after Q3/2008)	x	x	x	x	x	x
Observations	11131	10811	10657	11131	10811	10657

Appendix Table A8: Insider ownership and bank exits

This table reports results from a probit regression at the BHC level. The dependent variable in column (1) to (3) is a dummy variable, taking on the value of one whether the BHC is acquired/sold in the five years after Q2/2008; the dependent variable in columns (4) to (6) is a dummy variable, taking on a value of one whether the BHC is acquired/sold in the 10 years after Q2/2008. 'Insider ownership' is the share of insider ownership in 2008. 'ln(Total Assets)' is the natural logarithm of the BHC's total assets; 'Deposits / Assets' is the BHC's total deposits, scaled by total assets; 'Deposits / Assets' is the BHC's total deposits, scaled by total assets; 'Equity / RWA' is the BHC's total equity scaled by risk-adjusted assets; 'Other earning assets / Assets' is the BHC's other earning assets scaled by assets; 'Credit / Assets' is the BHC's total loans + unused commitments, scaled by assets; '=1 if large trading revenues' is an indicator taking on the value of one whether the BHC has large trading revenues in Q2/2008; '=1 if large real estate charge-offs' is an indicator variable, taking on the value of one whether the BHC has large real estate charge-offs in Q2/2008. All control variables are as of Q2/2008. Coefficients are multiplied by 100. Regression models include BHC and quarter fixed effects. Standard errors are clustered at the BHC level in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	=1 if BHC is acquired/sold in the period Q2/2008 until Q2/2013			=1 if BHC is acquired/sold in the period Q2/2008 until Q2/2018		
Insider Ownership	-0.371*** (-3.47)	-0.402*** (-3.83)	-0.386*** (-3.55)	-0.211*** (-3.58)	-0.211*** (-3.28)	-0.186*** (-2.85)
Log(Total Assets)		-0.113 (-1.59)	-0.155* (-1.92)		-0.0536 (-1.11)	-0.0589 (-1.16)
Total equity capital / Total assets		-0.0148 (-0.61)	-0.0132 (-0.57)		-0.0196 (-1.01)	-0.0160 (-0.89)
Other earning assets / Total assets		-0.0132 (-1.60)	-0.0140 (-1.60)		-0.00315 (-0.49)	-0.00339 (-0.53)
Total deposits / Total assets		-0.0529 (-1.08)	-0.0635 (-1.16)		-0.0899** (-2.22)	-0.0888** (-2.11)
Credit / Total Assets		-0.00254 (-0.92)	-0.00368 (-1.11)		0.00217 (0.87)	0.00144 (0.60)
=1 if large trading revenue			0.958** (2.09)			-0.0975 (-0.22)
=1 if large real estate charge-offs			0.121 (0.32)			0.0336 (0.15)
=1 if sale of common stock in previous year			0.338* (1.85)			0.285** (2.49)
Observations	714	668	656	714	668	656