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Working Paper

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ECB Working Paper, No. 2511

Provided in Cooperation with:
European Central Bank (ECB)

Suggested Citation: Goetz, Martin; Laeven, Luc; Levine, Ross (2021) : Do bank insiders impede equity issuances?, ECB Working Paper, No. 2511, ISBN 978-92-899-4511-0, European Central Bank (ECB), Frankfurt a. M.,
https://doi.org/10.2866/206869

This Version is available at:
https://hdl.handle.net/10419/229125

EUROPEAN CENTRAL BANK
EUROSYSTEM

Working Paper Series

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Do bank insiders impede equity issuances?

No 2511 / January 2021

Abstract: We evaluate the role of insider ownership in shaping banks' equity issuances in response to the global financial crisis. We construct a unique dataset on the ownership structure of U.S. banks and their equity issuances and discover that greater insider ownership leads to less equity issuances. Several tests are consistent with the view that bank insiders are reluctant to reduce their private benefits of control by diluting their ownership through equity issuances. Given the connection between bank equity and lending, the results stress that ownership structure can shape the resilience of banks—and hence the entire economy—to aggregate shocks.

Keywords: Ownership Structure, Equity Issuances, Banking, Financial Crisis, Regulation
JEL Codes: G32; G21; G28

Executive summary

Banks with more equity tend to lend more, create more liquidity, and have higher probabilities of surviving crises. Moreover, adverse shocks to bank equity predict contractions in lending and aggregate output, and lower bank equity ratios slow recoveries from crises. The strong linkages between bank equity, bank lending, and economic activity raise a critical question: what factors shape the differing degrees to which banks issue new stock to replenish bank equity in response to crises?

In this paper, we address a debate concerning the impact of bank ownership structure on the degree to which banks sell stock to replenish equity following adverse shocks. In the presence of large private benefits of control, a bank's controlling owners may resist new stock issuances to protect those rents. From this "dilution reluctance" perspective, greater insider ownership will reduce stock sales, potentially making the economy less resilient to aggregate shocks. In contrast, other research suggests that banks with greater insider ownership can more effectively coordinate the actions of diverse stakeholders with differing interests during crises, allowing such banks to sell more stock than banks with less insider ownership. The overall impact of insider ownership on stock sales in times of crisis, therefore, is an open empirical question.

We evaluate the role of insider ownership in shaping U.S. banks' sale of stock in response to the 2008 global financial crisis, which adversely affected bank valuations and put pressure on banks to raise new capital. We compile a unique database on the ownership structure and equity issuances of private and public banks. We hand-collect data on the ownership of 566 U.S. bank holding companies (BHCs), where we focus on the role of insider owners, i.e., bank directors and executives. We define "insider ownership" as the proportion of the BHC's stock owned by bank directors and executives. We also calculate "common stock sales" for each BHC as the total amount of funds raised through common stock sales as a proportion of bank equity. Using these data, we explore how insider ownership shaped banks' common stock issuances following the onset of the financial crisis.

We discover that greater insider ownership is associated with less common stock sales following the onset of the crisis. The estimates suggest an economically large relationship. For example, consider two otherwise identical banks, where the "high" insider ownership BHC has one standard deviation greater insider ownership than the "low" BHC. The estimates suggest that the "high" insider ownership bank would have common stock sales as a proportion of bank equity that are about 22% higher than "low" insider ownership bank. The results are robust to using several statistical strategies for addressing concerns about reverse causality and consistent with the idea that insiders are reluctant to dilute control rights by selling common stock.

We also show that the relationship between ownership structure and equity issuances varies across banks in a manner that is consistent with the "dilution reluctance" view. First, we examine whether banks that provide greater private benefits to insiders are also banks that are more reluctant to dilute insider control through equity issuances following the onset of the crisis. To measure the private benefits of control, we compute (a) the share of loans to bank insiders and (b) the level of bank opacity, since greater opacity hinders effective governance by non-insiders, offering greater private benefits of control. Consistent with this private benefits view, the impact of ownership structure on equity issuances is larger among banks that offer more private benefits to insiders.

Second, we examine whether insider owners are more reluctant to dilute their control rights through equity issuances when the expected positive impact of issuances on the banks is smaller. Specifically, as the expected benefits from selling new shares in the form of increased bank stability and market valuations falls, insiders will become increasingly reluctant to issue stock and sacrifice private benefits of control. According to this perspective, the insider owners of banks that are harder hit by shocks and hence less likely to benefit from equity injections will be more reluctant to sell stock. We use two measures of the degree to which each BHC is adversely affected by the financial crisis. We use information on BHCs' branch networks and determine BHCs' exposure to declines in housing prices during the financial crisis. The second measure uses information on BHCs'

investment in mortgage-backed securities, as the crisis induced market participants to view these assets as “toxic” and value them accordingly.

We again find evidence consistent with the dilution reluctance view: bank insiders are reluctant to reduce their private benefits of control by issuing equity, especially when the positive effects of stock sales are likely to have smaller positive effects on bank valuations. The negative impact of insider ownership on stock sales is stronger among banks more adversely affected by the financial crisis.

Our study speaks to recent policy reforms to bank regulations that have increasingly emphasized the quality of bank capital not just its quantity. For example, Basel III introduced a minimum common equity requirement with the goal of ensuring that banks not have a sufficient quantity of capital also have sufficient amount of the most efficient and effective loss-absorbing liability: common equity. These regulatory changes, however, have not yet considered ownership structure. Our work stresses the importance of ownership structure, finding that ownership structure shapes common equity issuances in response to a crisis and hence affects a bank’s resilience to adverse shocks. This 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.

1. Introduction

There are strong linkages between bank equity and economic stability. As reviewed by Thakor (2014), banks with more equity tend to lend more, create more liquidity, and have higher probabilities of surviving crises. Baron, Verner, and Xiong (2019) show that adverse shocks to bank equity predict contractions in lending and output, while Berger and Bouwman (2013) and Jorda et al. (2017) discover that lower bank equity ratios are associated with slower recoveries following crises.[1] Extensive research also stresses that bank equity can foster stability by mitigating excessive risk-taking by banks and absorbing adverse shocks to bank assets (e.g., Boot and Greenbaum 1993). These connections between bank equity and the resilience of the economy to aggregate shocks highlight the value of understanding the factors that shape the differing degrees to which banks issue new stock to replenish bank equity in response to crises. The comparative incentives and influence of differing owners are one potential factor influencing stock sales.

Research offers conflicting perspectives on the impact of ownership structure on stock issuances following adverse shocks to bank equity. In the presence of large private benefits of control, a bank's controlling owners may resist new stock issuances to protect those rents (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. In contrast, other research suggests that banks with greater insider ownership can more effectively coordinate the actions of stakeholders with differing interests during crises, (e.g., Chakraborty and Gantchev 2013), allowing such banks to sell more stock than banks with less insider ownership. The overall impact of insider ownership on stock sales in times of crisis, therefore, is an open empirical question.

In this paper, we evaluate the role of insider ownership in shaping U.S. banks' sale of stock in response to the 2008 global financial crisis, which adversely bank valuations and put

[1] Theory explains how reductions in bank equity can reduce lending by increasing the risk premium paid by banks, reducing banks' ability to collateralize their assets, and hindering banks' ability to commitment to effective monitoring (e.g., Holmstrom and Tirole 1997; Bernanke, Gertler, and Gilchrist 1999; Gertler and Kiyotaki 2010; He and Krishnamurthy 2013; Brunnermeier and Sannikov 2014; and Rampini and Viswanathan 2018).

pressure on banks to raise new capital. We compile a unique database on the ownership structure and equity issuances of private and public banks. We hand-collect annual data on the ownership of 566 U.S. bank holding companies (BHCs). We define insiders as bank directors and executives, as reported in banks' regulatory FR Y-6 filings. Furthermore, we compile data on stock sales by each bank. Using these data, we explore how insider ownership shapes banks' stock issuances following the onset of the financial crisis.

There are two distinct periods of bank equity issuances following the collapse of Bear Stearns, the failure of Lehman Brothers, and the placement of Fannie Mae and Freddie Mac into government conservatorship. First, the U.S. Treasury started the Capital Purchase Program (CPP) in Q4/2008 that encouraged financial institutions to sell preferred stock to the Treasury. The program triggered a temporary surge in preferred stock sales in Q4/2008 and Q1/2009. Second, following Q1/2009, the Supervisory Capital Assessment Program (SCAP) ("stress test") results encouraged banks to issue common equity and/or make other adjustments to satisfy capital regulatory requirements (e.g., Bayazitova and Shivdasani 2012). Banks' sales of common stock increased markedly after Q1/2009. Given our focus on the potential dilution of control through stock sales, we are most concerned with common stock—and not CPP-induced preferred stock sales to the Treasury. Thus, we focus on the post-Q1/2009 period while controlling for bank issuances of preferred and common stock before Q2/2009, but note that our results are robust to including earlier quarters.

We employ three empirical tests to assess the relationship between insider ownership and equity issuances. First, we conduct cross-sectional analyses of common stock sales and insider ownership during the period from Q2/2009 through Q1/2011. We measure "insider ownership" as the proportion of the BHC's stock owned by insiders and calculate "common stock sales" as the total amount of funds raised through common stock sales as a proportion of bank equity in Q2/2008. We use ordinary least squares (OLS) regressions while controlling for an array of BHC-specific and geographic fixed effects. Second, to address concerns about the potential endogeneity of bank ownership, we employ a "shift-share" instrumental variable (IV) in the spirit of Bartik (1991) and Goldsmith-Pinkham, Sorkin and Swift (2018). Third, we extend these IV analyses and assess whether the relationship between

stock sales and insider ownership varies across banks in ways that are consistent with theories emphasizing that insider's private benefits of control exert a first-order influence on their reluctance to dilute those control rights through equity issuances.

From the OLS analyses, we discover that greater insider ownership is associated with less common stock sales following the onset of the crisis. The estimates suggest an economically large relationship. For example, consider two otherwise identical banks, where the "high" insider ownership BHC has one standard deviation greater insider ownership than the "low" BHC. The estimates suggest that the "high" insider ownership bank would have common stock sales as a proportion of bank equity that are about 22% greater than "low" insider ownership bank. These findings are robust to altering the control variables and to using different samples of banks. The results are consistent with the idea that insiders are reluctant to dilute control rights by selling common stock.

We continue to find that more insider ownership is associated with less common stock sales when using instrumental variables to better identify the impact of insider ownership on common stock sales. Specifically, we first identify for each BHC a set of peer banks that are similar in size but active in different areas of the country, and compute the change in the average level of insider ownership for these peers. To construct a predicted level of insider ownership for each BHC, we use insider ownership for the BHC in 2003 and multiply it by the average growth rate in insider ownership among its peer banks from 2003 through 2008. Under the assumption that a bank's sale of common stock after the release of the stress-test results in 2009 is exogenous to the change in average insider ownership of peer banks prior to 2009, this "shift-share" IV approach allows us to identify the causal effect of insider ownership on the sale of common stock. The 2SLS analyses confirm that greater insider ownership reduces common stock sales and the estimated effects are very similar to the OLS findings.

We next conduct two tests of whether—and discover that—the relationship between ownership structure and equity issuances varies across banks in a manner that is consistent with the "dilution reluctance" view. By testing whether the IV results hold especially strongly among banks where insiders are likely to be more resistant to losing their private benefits of

control, this improves our identification strategy. First, we examine whether banks that provide greater private benefits to insiders are also banks that are more reluctant to dilute insider control through equity issuances following the onset of the crisis. To measure the private benefits of control, we compute (a) the share of loans to bank insiders and (b) the level of bank opacity, since greater opacity hinders effective governance by non-insiders, offering greater private benefits of control (e.g., Jiang, Levine and Lin 2016). We then test whether the negative impact of insider ownership on equity issuances is stronger among banks offering greater benefits of control. Consistent with this private benefits view, the impact of ownership structure on equity issuances is larger among banks that offer more private benefits to insiders, i.e., among banks that lend more to insiders and are less transparent.

Second, we examine whether inside owners are more reluctant to dilute their control rights through equity issuances when the expected positive impact of issuances on the banks is smaller. Specifically, as the expected benefits from selling new shares in the form of increased bank stability and market valuations falls, insiders will become increasingly reluctant to issue stock and sacrifice private benefits of control. According to this perspective, the inside owners of banks that are harder hit by shocks and hence less likely to benefit from equity injections will be more reluctant to sell stock. We use two measures of the degree to which each BHC is adversely affected by the financial crisis. Similar to Bord, Ivashina and Taliaferro (2018), we use information on BHCs' branch networks and determine BHCs' exposure to declines in housing prices during the financial crisis. The second measure uses information on BHCs' investment in mortgage-backed securities (MBS), as the crisis induced market participants to view these assets as "toxic" and value them accordingly. We compute each bank's holdings of MBS to gauge its exposure to the adverse shock to the value of these assets.

We again find evidence consistent with the dilution reluctance view: bank insiders are reluctant to reduce their private benefits of control by issuing equity, especially when the positive effects of stock sales are likely to have smaller positive effects on bank valuations.

We find that the negative impact of insider ownership on stock sales is stronger among banks more adversely effected by the financial 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 survival of the bank. 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; and Beltratti and Stulz 2012). Focusing on the global financial crisis, Fahlenbrach and Stulz (2011) find that banks with larger managerial ownership, if anything, performed worse during the global financial crisis. We contribute to this literature by analyzing the sale of bank stock following the onset of the crisis, and linking differences in those to sales to differences in the ownership structures of banks.

Our paper complements the examination of European banks by Lepetit, Saghi-Zedek, and Tarazi (2015). They 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 has control rights that materially exceed cash-flow rights and (b) the bank operates in a country with weak shareholder protection laws. Our work differs in several ways. First, rather than examining differences between control and cash-flow rights, we focus on the influence of inside owners on stock sales. This focus on insiders both complements the study of European ownership pyramids and is more relevant for U.S. banks, where differences between control and cash flow rights are less central (e.g., Caprio, Laeven, and Levine 2007). Second, we focus on issuances of common equity, which is crucial for understanding the role of the private benefits of control in shaping stock sales following the onset of the global financial crisis.

Our paper also relates to recent research by Baron and Xiong (2017), Baron, Verner, and Xiong (2019), and Baron (2020). This work examines the countercyclical equity issuance puzzle: banks raise less common equity during credit expansions and raise comparatively more equity in economic downturns. For example, Baron (2020) presents a model and

evidence consistent with the view that government guarantees to bank creditors help account for 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 a large 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 firms, and stock-exchange listed firms for which data on insider shareholdings is publicly available. We contribute to this literature by analyzing public and private firms. This is possible because the FR-Y6 regulatory filings are available for both publicly listed and privately-owned banks. This offers a unique setting to study the effects of different ownership structures on equity issuance decisions within publicly-listed and privately-owned firms, which is the more typical ownership type in the United States and worldwide.

Finally, our study speaks to recent policy reforms to bank regulations that have increasingly emphasized 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 with the goal of ensuring that banks not have a sufficient quantity of capital also have sufficient amount of the most efficient and effective loss-absorbing liability: common equity. These regulatory changes, however, have not yet considered ownership structure. Our work stresses the importance of ownership structure, finding that ownership structure shapes common equity issuances in response to a crisis and hence affects a bank's resilience to adverse shocks. This 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 Stock Sales: Data and Patterns

We assemble a unique dataset on bank ownership and combine those data with information on the issuance of bank stock and other bank traits. We examine domestically-owned bank holding companies that are organized as stock corporations. Our sample consists of 566 BHCs with non-missing information on ownership and stock sales.

2.1 Bank ownership

We assemble a new database on bank ownership from BHCs' regulatory filings (FR Y-6) for public and private U.S. BHCs. U.S. law requires BHCs to file FR Y-6 reports with information on the identity and percentage ownership stakes of principal shareholders, directors and executive officers. We go through each of the FR Y-6 reports compiled by SNL Financial and manually construct a database on the percentage of each BHC owned by directors and executives over the period from 2003 through 2008, data permitting.[2] We exclude (a) BHCs with missing data on the sale of common stock or ownership, (b) BHCs owned by a foreign entity, and (c) BHCs that are not organized as a stock corporation. This yields a sample of 566. This sample includes public and private banks, which is unusual in corporate finance given the challenges of collecting such data for large samples of private firms (e.g., Helwege, Pirinsky, and Stulz 2007; Fahlenbrach and Stulz 2009).

Insider Ownership equals the percentage of common stock owned by bank insiders, i.e., directors and executives. For most of the analyses, we measure ownership in 2008, but the results are robust, as shown in the Appendix, to using *Insider Ownership* in 2003, as ownership structure changes little over time.

[2] The FR Y-6 filings sometimes provide imprecise information ownership by an insider when the holdings are small, e.g., indicating that a person owns "less than 0.1% of shares." We used a variety of approaches for addressing this, including setting such ownership shares to zero or setting aggregate insider ownership shares equal to zero if the summation across all insiders was less than five percent of total shares. We report the results using this 5% cutoff as our focus is on assessing whether insiders make decisions about stock sales based on their private benefits of control and many studies use such a cutoff. The results reported below, however, are robust to using alternative methods.

2.2 Sales of bank stock

We collect information on the sale of common (item bhck3579) and preferred stock (item bhck3577) by U.S. BHCs from regulatory filings FR Y-9C. For most of our analyses, we focus on sales of common stock over the period from Q2/2009 through Q1/2011. Specifically, *Sale of Common Stock* equals the total amount of funds raised by the sale of common stock over the Q2/2009-Q1/2011 period divided by bank equity capital in Q2/2008, where bank equity capital is total BHC equity reported in FR Y-9C filings (item bhck3210).[3] We winsorize *Sale of Common Stock* at the top 1 percentile. In some analyses, we examine a longer time period and compute the *Cumulative Sale of Common Stock* at the quarterly frequency starting in Q2/2007, scaled by bank equity in Q1/2007. We use analogous definitions for cumulative preferred stock sales and total stock sales.

As noted in the Introduction, we focus—though not exclusively—on the sale of common stock from Q2/2009 through Q1/2011 for two reasons. First, we are concerned with the control rights, and hence the voting rights, of insiders, which naturally focuses our attention on common stock. Second, we do not want to focus on CPP-induced stock sales to the U.S. Treasury in Q4/2008 and Q1/2009. As a result, the bulk of our analyses cover the post-Q1/2009 period while controlling for bank issuances of preferred and common stock before Q2/2009. The results, however, hold, if we also include the Q4/2008 - Q1/2009 period.

2.3 BHC-specific control variables

We condition on an array of BHC-specific control variables. We obtain other balance sheet information on BHCs from regulatory FR Y-9C ("Call Report") filings. We compute these bank characteristics in Q2/2008, which was immediately after the failure of Bear Stearns and before the collapse of Lehman Brothers in September of 2008. Thus, we view them as pre-determined with respect to the onset of the crisis.

The baseline set of BHC-specific control variables are as follows, where all are measured in Q2/2008. *Equity Capital / RWA* equals the ratio of bank equity capital to risk

[3] All of the results hold when scaling by Tier 1 Capital rather than by total BHC equity.

weighted assets (RWA). *ln(Risk Weighted Assets)* is the natural logarithm of risk weighted assets. *Deposits / Assets* is the ratio of deposits to total assets. *Loans/Assets* is the ratio of loans to total assets. *Other Earning Assets / Assets* is the share of other earning assets in total assets. *Income Diversity* is defined as one minus the absolute value of (Interest income - Noninterest income), divided by total operating income. *Noninterest income / Operating income* is the ratio of noninterest income to operating income. *Dividends / Net Income* is the ratio of dividends to net income. *Net Income / Equity* Capital is the ratio of net income to bank equity. We winsorize these control variables at the bottom and top 1 percentile. Finally, the baseline set of control variables also includes a dummy variable that equals one if the BHC received TARP support (*=1 if BHC received TARP*).

2.4. Descriptive statistics and patterns

Table 1 reports descriptive statistics. On average, insiders held about 33% of a BHC's common stock in 2008. There is substantial heterogeneity, as the standard deviation is 31%. Indeed, 13 BHCs (= 2.3% of our sample) report that insiders do not hold any ownership in the BHCs, while 23 BHCs (4% of our sample) are fully owned by bank insiders. While insiders hold less than 7.5% of all shares for a quarter of all BHCs (bottom quartile), a quarter of all BHCs report that insider hold at least 54%. *Sale of Common Stock* over the Q2/2009 – Q1/2011 averaged about 7% with substantial cross-bank differences as the standard deviation is 17%. The average ratio of bank equity to risk-weighted assets (*Equity Capital/RWA*) in Q2/2008 was 11.4%, suggesting that the average BHC was well capitalized as the crisis began.

2.4.1 Insider Ownership

Ownership structure is stable over time. Figure 1 displays the boxplot of insider ownership for each year (Panel A). The interquartile range is quite stable over time indicating that the distribution of insider ownership remains similar, though there is a slight decrease over time, with median insider ownership of 28% in in 2003 and 24% in 2008. Panel B explores this more where we plot the insider ownership of a BHC in 2008 against its insider ownership in 2003. The linear fit is represented by the dashed line, indicating a strong and

positive correlation between the insider ownership in 2008 and 2003. The coefficient estimate of a regression of insider ownership in 2008 on insider ownership in 2003 is 0.92 and statistically significant at the 1% level.

2.4.2 Sale of Stock

Figure 2 illustrates the cumulative sales of common and preferred stock from Q2/2007 through Q1/2011. The sale of preferred stock surged in Q4/2008 and Q1/2009, as banks were encouraged to sell preferred shares to the U.S. Treasury as part of the CPP. After that, there were exceedingly small amounts of preferred stock sales. In contrast, sales of common stock rise throughout the period, with issuances accelerating after Q2/2009.

Figure 3 documents the negative relationship between *Sale of Common Stock* from Q2/2009 to Q1/2011 and *Insider Ownership*. Specifically, we first group BHCs into decile bins based on *Insider Ownership*, so that the first bin contains BHCs in the lowest *Insider Ownership* decile and the tenth bin contains all BHCs in the highest decile of *Insider Ownership*. For each bin, we then compute the average *Sale of Common Stock* across BHCs in the bin and the average *Insider Ownership*. We plot these observations in Figure 2, illustrating the negative correlation between *Sale of Common Stock* and *Insider Ownership*.

Figure 4 documents the evolution of common stock sales from Q2/2007 through Q1/2011 while differentiating banks by the degree of insider ownership. To construct the figure, we first estimate the following regression using quarterly information at the BHC-level, from Q2/2007 through Q1/2011:

$$Cumulative\ Sale\ of\ Common\ Stock_{i,t} = \sum_{t=1}^{16}(\beta_{1,t}D_t + \beta_{2,t}High\ Insider_i * D_t) + \varepsilon_{i,t}, \quad (2)$$

where $Cumulative\ Sale\ of\ Common\ Stock_{i,t}$ is the cumulative sale of common stock by BHC i from Q2/2007 through quarter t, scaled by bank equity capital in Q1/2007, $High\ Insider_i$ equals one if BHC i has above the median *Insider Ownership* and zero otherwise, and D_t is a dummy variable that equals one in quarter t, and otherwise equals zero. Thus, the vector, D, simply represents time-fixed effects for the 16 quarters from Q2/2007 through Q1/2011. Consequently, $\hat{\beta}_{1,t}$ represents the estimated average *Cumulative Sale of*

Common Stock in quarter *t*, and $\hat{\beta}_{2,t}$ is the estimated difference between this estimate for the average BHC and BHCs with above the median values of *Insider Ownership*. Figure 3 plots $\hat{\beta}_{2,t}$ for each quarter as well as the 99% confidence interval after standardizing $\hat{\beta}_{2,t}$, so that they represent the change in cumulative common stock sales for a one standard deviation increase in insider ownership.

As shown, there is a notable and statistically significant divergence in *Cumulative Sale of Common Stock* for BHCs with above the median levels of *Insider Ownership* relative to the average BHC in the sample after Q1/2009. Although the high-insider ownership BHCs tend to sell less common stock than other BHCs throughout the sample period and the estimated gap in common stock sales between high- and low-insider ownership BHCs starts to widen in 2008, the estimated difference does not become statistically significant until Q2/2009, which is after the CPP-induced sales of preferred stock to the U.S. Treasury. Taken together, Figures 1-3 offer patterns that are consistent with the view that banks with greater insider ownership sell less common stock following the onset of the crisis. To control of other factors, improve identification, and provide direct evidence on the view that bank insiders are reluctant to have their banks sell common equity and dilute their control over their banks because it would reduce the ability of those insiders to extract private rents, we now turn to OLS, IV, and split sample analyses.

3. Ownership and the Sale of Common Stock

3.1 Econometric model: OLS

We evaluate the relationship between the sale of common stock and ownership structure over the period using the following cross-section regression in an approach similar to Beltratti and Stulz (2012) and Fahlenbrach and Stulz (2011):

$$Sale\ of\ Common\ Stock = \alpha + \beta Insider\ Ownership + X'\gamma + \delta + \varepsilon, \qquad (1)$$

where X' is composed of BHC-specific traits, and δ is a set of Federal Reserve District fixed effects. We include these fixed effects to account for potential unobservable heterogeneity in bank supervision and regulation across the twelve Federal Reserve Districts. We classify a

BHC as belonging to a particular district based on the location of its headquarters. We standardize the estimated coefficients, $\hat{\beta}$ and $\hat{\gamma}$, to facilitate interpretation of the estimated magnitudes. Specifically, the standardized coefficients indicate the estimated number of standard deviation changes in the dependent variable associated with a one standard deviation change in the explanatory variable.

Table 2 reports regression results using different controls. Column (1) conditions on the baseline set of BHC-specific control variables defined in Section 2.3. To these baseline controls, column (2) adds the change in risk-weighted-assets (*Change in RWA*) from Q2/2009 through Q1/2011. Since banks may sell stock or reduce RWA to meet regulatory capital requirements, we control for the change in risk-weighted assets over this period to assess the independent connection between insider ownership and stock sales. To the baseline controls, column (3) adds the change in the ratio of bank equity to risk-weighted assets (*Change in Equity/RWA*) from Q2/2008 through Q1/2009. We include *Change in Equity/RWA* to address the possibility that the relationship between ownership and equity issuances after Q1/2009 depends on stock sales—including regulatory-induced stock sales—during the initial months of the crisis. Finally, column (4) includes all control variables simultaneously.

3.2 Results: OLS

As shown in Table 2, BHCs sell less stock when insiders own a larger proportion of the BHC. The results are robust: *Insider Ownership* enters negatively and significantly at the one-percent level in all four specifications; and the estimated coefficient *Insider Ownership* hardly changes when using different control variables. Furthermore, the estimated relationship is economically meaningful. For example, the estimates indicate that BHCs with one standard deviation greater *Insider Ownership* tend to sell about 9% less of a standard deviation common stock than otherwise similar BHCs following the 2009 stress-tests. To put this in dollar terms, consider both a BHC with "high" insider ownership, which we will define as 0.5 standard deviations above the sample mean level of insider ownership, and an otherwise similar BHC with "low" insider ownership, which we will similarly define as having 0.5 standard deviations less insider ownership than the sample mean. The estimated

coefficient on *Insider Ownership* indicates that in the high insider ownership bank, sales of common stock as a proportion of total bank equity will be 1.5% lower in the high insider ownership BHC relative to the low insider ownership bank (1.5=16.71*0.089.). This is large since average common equity sales were 7% of bank equity.

Focusing on the non-ownership control variables, we note the following. First, the results in Table 2 are robust to controlling for the large array of BHC-specific features, including *Equity Capital / RWA*, *ln(Risk Weighted Assets)*, *Deposits / Assets*, *Loans/Assets*, *Other Earning Assets / Assets*, *Income Diversity*, *Noninterest income / Operating income*, *Dividends / Net Income*, *Net Income / Equity Capital*, and *=1 if BHC received TARP*), which helps in mitigating omitted variable bias concerns. Second, the correlation between *Insider Ownership* and *Equity Capital / RWA* is both low (-0.048) and insignificant, suggesting that the degree of insider ownership is not a proxy for bank capitalization. Third, larger banks—as measured by *Ln(RWA)*—sell more common stock as a fraction of bank equity. This is not surprising since larger banks tend to face few barriers to conducting seasoned equity offerings and following the stress-test results, larger banks faced stronger regulatory pressures to issue new common stock. Fourth, the *Change in RWA* (from Q2/2009 through Q1/2011) enters positively and significantly: banks that expanded after the crisis also issued more common stock during that period.

3.3 Estimation strategy: Instrumental variables (IV) based on a shift-shares approach

Although 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, omitted variables could account for these findings. For example, unobservable differences in the ability of inside and outside investors to monitor bank managers could explain both the degree of insider ownership and the BHC's access to equity markets and hence common stock sales following 2008.

To better identify the impact of ownership structure on BHC sales of common stock, we construct a Bartik-type shift-share instrumental variable for *Insider Ownership*. Bartik (1991) developed an approach to capture the exogenous component of local employment

growth. He interacted pre-determined local industry employment shares with national industry employment growth rates. Under the assumption that these national growth rates are exogenous to local industries, this interaction term can plausibly serve as an instrumental variable for local employment growth (Goldsmith-Pinkham, Sorkin and Swift, 2018).

Following this approach, we start by identifying 30 peer-banks for each bank *b*. The peer banks (a) have no overlap in their branch network with bank *b* (Levine, Lin and Wang, 2017) and (b) are similar to bank *b* with respect to total assets. We then compute this peer group's average growth rate in *Insider Ownership* between 2003 and 2008. Finally, to construct a bank-specific instrument for bank *b*, we multiply *b*'s value of *Insider Ownership* in 2003 by the average growth rate of *b*'s peer banks' *Insider Ownership* between 2003 and 2008. This "shift-share" instrumental variable then captures for each bank *b* its "predicted" level of insider ownership. Under the assumption that stock sales by bank *b* from Q2/2009 through Q1/2011 is not otherwise related to changes in the insider ownership of the bank's peers from 2003 through 2008, this instrumental variable is a valid instrument for insider ownership for bank *b*. We call this Bartik-type instrument, *Predicted Insider Ownership*.

In Table 3, we present the IV results in Panel A, the first-stage findings in Panel B, and the reduced form results in Panel C. For each panel, we provide the estimates using the same four sets of control variables from Table 2.

3.4 Results: IV

As shown, the IV results confirm the OLS findings: BHCs with more insider ownership sell less stock during the Q2/2009 to Q1/2011 period than other banks. *Insider Ownership* enters negatively and significantly across all four specifications. Moreover, the IV coefficients are similar to the OLS estimates from Table 2. The first stage regression results show that there is a positive and statistically significant link between the predicted level of bank *b*'s insider ownership share (*Predicted Insider Ownership*) and the bank's actual degree of insider ownership share (*Insider Ownership*). The reduced form regression results also indicate that the instrumental variable, *Predicted Insider Ownership*, is strongly negatively associated with the sale of common stock by banks.

By instrumenting for insider ownership, we ameliorate concerns that some third factor is shaping both insider ownership and stock sales. Our findings on stock sales are consistent with the idea that inside owners are reluctant to issue equity and dilute their ownership stakes in order to preserve their private benefits of control. We now differentiate among banks to test more directly whether such "dilution reluctance" drives the relationship between stock sales and insider ownership.

3.5 Dilution reluctance

We next test whether the relationship between insider ownership and stock sales varies across banks in a manner that is consistent with the view that bank insiders are reluctant to reduce their private benefits of control by issuing equity. In particular, we differentiate banks by the degree to which insiders enjoy private benefits of control. We then test whether the negative relationship between insider ownership and stock sales is stronger among high private-benefit banks. These tests provide additional information on the mechanisms linking ownership structure and stock sales, which also improves identification.

To differentiate banks, we use two measures of the private benefits of control. The first measure—insider lending—gauges the degree to which banks extend credit to bank insiders i.e. executive officers, directors, principal shareholders etc. This information is provided for all commercial banks, and we aggregate this information at the BHC level and calculate the share of insider loans in a BHC's loan portfolio in the first quarter of 2009. On average, about 1.7 percent of a BHC's total loan amount in our sample consists of loans to bank insiders. We split the sample based on the median share of insider loans and consider BHCs that have an above median level of insider lending ("High" insider lending) to offer more private benefits to inside owners than other banks (i.e., "Low" insider lending banks).

The second indicator of the private benefits of control—bank opacity—measures the degree to which bank insiders have the latitude to exploit their control of the bank to extract private benefits. To measure bank opacity, a large literature, reviewed by Dechow, Ge and Schrand (2010), compares banks' observed loan loss provisions with predicted loan loss provisions obtained from a statistical model. These "abnormal" accruals of loan loss

provisions are indicative of greater bank opacity as they reflect greater earnings management by bank managers. Following Jiang, Levine and Lin (2016), we construct abnormal loan loss provision accruals and split the sample into high and low opacity banks by whether they have "abnormal" accruals above or below the sample median. We split the sample of banks into those with above the median levels of abnormal loan loss provision accruals—"High" opacity BHCs—and those with below the median levels—"Low" opacity BHCs.

As shown in Table 4, we find evidence consistent with the dilution reluctance view: bank insiders were more reluctant to have their banks sell stock during the crisis when the private benefits of controlling a bank were larger. That is, the negative impact of insider ownership on stock sales is larger among banks that offer more private benefits of control to insiders. In Panel A of Table 4, we split the sample by "Low" and "High" insider lending banks, and split the sample by "Low" and "High opacity banks in Panel B. We again present the results using different combinations of control variables. Across the different splits, we find that in banks that offer greater private benefits to insiders—*High insider lending* and *High opacity* banks, the degree of insider ownership is more negatively associated with stock sales. That is, when the private benefits of control are higher, banks are more reluctant to dilute those control benefits through equity issuances.

3.6 Adverse Shock to Equity

We next test whether the impact of insider ownership on stock sales by banks is larger among banks hit harder by the financial crisis. We conduct this test to shed additional empirical light on the importance of the private benefits of control in shaping bank issuances of stock. In particular, we take that perspective that there are costs and benefits to insiders from having the bank sell stock following the onset of the crisis. One potential benefit to insider owners is that common stock sales augment the bank's capital cushion, increase the viability of the bank, and boost the value of insiders' shares. One potential cost to insiders is that such stock sales reduce their control over the bank and the private benefits that they can extract. When adverse shocks materially reduce the likelihood that common stock sales will boost the value of bank shares, then inside owners will become more focused on preventing

equity issuances that will dilute their control and hence reduce their abilities to extract private benefits. From this perspective, banks in which insiders hold larger proportions of equity will become more intensely focused on resisting equity issuances when their banks are hit with large, adverse shocks.

To conduct this test, we use two measures of the degree to which banks were adversely hit by the financial crisis. First, following Bord, Ivashina and Taliaferro (2018), we use information on BHCs branch networks and determine BHCs' exposure to declines in housing prices. To do this, we combine information on the location of bank branches with data on changes in house prices in each Metropolitan Statistical Area (MSA) between Q2/2007 and Q4/2008. This yields information on the exposure of each BHC, through its branch network, to declines in housing prices. About a third of all BHCs do not report branches in MSAs that experience a local downturn during the financial crisis. The other two thirds of BHCs have branches in areas that experience house price declines. We separately examine each of these two types of banks.

The second measure of the degree to which banks were adversely affected by the crisis focuses on their investment in mortgage backed securities (MBS). The expansion of the U.S. mortgage market and the ability to securitize mortgages and sell them in financial markets led to a reduction in lending standards and thus MBS (Keys et al., 2010). Capital regulation, however, considered MBS less risky, incentivizing banks to invest in them. Concerns regarding the quality of mortgage-backed securities intensified after the collapse of Bear Stearns due to the bank's heavy investment in these securities, deeming these assets toxic. We split banks by whether they have above the median exposure to MBS as share of their total assets in Q1/2009 and call them "High" MBS exposure banks, and banks with below the median exposure, e.g., "Low" MBS exposure banks.

Consistent with the view that insiders value their private benefits of control of banks and are therefore reluctant to sell stock even during a major financial crisis, we find that the impact of insider ownership on stock sales is more negative among banks hit hardest by the crisis. In Panel C of Table 4, we report regression results where we split banks by whether they are present in areas that experience a reduction in house prices during the financial crisis

or whether the banks were not active in those areas. In Panel D of Table 4, we report results where we split banks depending on their exposure to MBS. We find that insider ownership leads to a reduction in banks' sale of common stock, especially among banks that (a) are active in areas that experience a reduction in local house prices and (b) depended more on MBS when the mortgage crisis hit. These findings indicate that when adverse shocks reduce the expected value of banks' equity, bank insiders become focused on extracting private benefits from the bank, so that insiders with larger shares of equity more effectively resist bank equity sales.

4. Conclusions

In this paper, we construct a unique dataset on the ownership structure of banks to examine the impact of insider ownership on equity issuances. Consistent with the view that inside owners are reluctant to lose their private benefits of control by diluting that control through equity issuances, we find that the share of insider ownership is negatively associated with equity issuances after the onset of the financial crisis. This suggests that the private benefits of control—and hence the ownership structure of banks—shaped how U.S. BHCs responded to the global financial crisis. Our results highlight an important channel through which ownership structure affects capital buffers and hence the resilience and stability of banks.

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Table 1: Summary statistics

This table presents descriptive statistics. 'Insider ownership (%)' is the share of stock, held by insiders in 2008, 'Predicted Insider ownership (%)' is the predicted insider ownership for a bank in 2008, 'Sale of common stock' is the total sale of common stock over the quarters Q2/2009 to Q1/2011, scaled by equity capital in Q2/2008, 'Equity capital / RWA' is total equity capital, scaled by RWA, 'ln(Risk weighted assets)' is the natural logarithm of risk weighted assets in Q2/2008, 'Deposits/Assets' is the share of deposits in total assets, 'Loans/Assets' is the share of loans in total assets, 'Other earning assets/Assets' is the share of other earning assets in total assets, 'Income diversity' is defined as 1 minus the absolute value of (Interest income - Noninterest income), divided by total operating income, 'Noninterest income/Operating income' is the share of noninterest income in operating income, 'Change in RWA' is the change of risk-weighted assets. '=1 if BHC received TARP' is an indicator variable, taking on the value of one whether a bank received financial support as part of TARP. 'Dividends / Net income (Q2/2008)' is the ratio of dividends to net income in Q2/2008, 'Net income / Equity capital (Q2/2008)' is the ratio of net income to equity capital in Q2/2008,'Change in RWA (Q2/2009 to Q1/2011)' is the ratio of RWA in Q1/2011 to RWA in Q2/2009 minus 1, 'Change in Equity capital/RWA (Q2/2008 to Q1/2009)' is the difference between the ratio of equity capital and RWA in Q1/2009 and the ratio of equity capital and RWA in Q2/2008. The calendar quarters when these variables are computed are reported in parentheses.

	N	Mean	St.Dev.	25th pct	Median	75th pct	Min	Max
Insider ownership (%)	566	33.25	30.96	7.58	23.52	53.90	0	100.00
Predicted Insider ownership (%)	493	34.43	31.25	8.64	25.79	51.33	0	138.78
Sale of common stock (* 100)	566	7.19	16.71	0	0.02	4.11	-0.02	96.88
Ln(Risk weighted assets) (Q2/2008)	566	13.80	1.11	13.10	13.54	14.17	12.07	18.59
Deposits / Assets (Q2/2008)	566	0.76	0.09	0.72	0.77	0.82	0.38	0.90
Loans / Assets (Q2/2008)	566	0.70	0.11	0.65	0.72	0.78	0.31	0.90
Other earning assets / Assets (Q2/2008)	566	0.01	0.01	0	0	0.01	0	0.09
Income diversity (Q2/2008)	566	0.66	0.11	0.58	0.65	0.73	0.37	0.96
Noninterest income / Operating income (Q2/2008)	566	0.17	0.10	0.11	0.15	0.20	0.01	0.60
Equity capital / RWA (Q2/2008) (*100)	566	11.42	3.81	8.75	10.78	13.41	5.11	27.40
Sale of common stock (Q3/2008 to Q1/2009) (*100)	566	0.97	3.00	0	0	0.70	0	22.00
=1 if BHC received TARP	566	0.32	0.47	0	0	1	0	1
Dividends / Net income (Q2/2008)	566	0.45	0.69	0.13	0.39	0.61	-1.72	4.13
Net income / Equity capital (Q2/2008)	566	0.04	0.04	0.03	0.05	0.06	-0.21	0.14
Change in RWA (Q2/2009 to Q1/2011)	554	-0.06	0.16	-0.15	-0.05	0.03	-0.47	0.58
Change in equity capital / RWA (Q2/2008 to Q1/2009)	566	0.45	1.83	-0.52	0.32	1.72	-5.79	4.55

Table 2: Ownership and sale of common stock

This table reports results from an OLS regression at the BHC-level. 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 dependent variable in all models is the total sale of common stock over the quarters Q2/2009 to Q1/2011, scaled by equity capital in Q2/2008. Dependent variables and control variables are defined in Table 1. Standard errors are heteroscedasticity robust and reported in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)
Insider ownership	-0.090***	-0.087***	-0.088***	-0.089***
	(0.032)	(0.032)	(0.032)	(0.032)
Ln(Risk weighted assets) (Q2/2008)	0.190***	0.219***	0.189***	0.220***
	(0.043)	(0.042)	(0.043)	(0.042)
Deposits / Assets (Q2/2008)	0.024	0.001	0.021	0.003
	(0.037)	(0.039)	(0.037)	(0.038)
Loans / Assets (Q2/2008)	0.099*	0.085	0.098*	0.087
	(0.053)	(0.053)	(0.053)	(0.053)
Other earning assets / Assets (Q2/2008)	0.013	-0.008	0.014	-0.009
	(0.033)	(0.035)	(0.033)	(0.035)
Income diversity (Q2/2008)	-0.057	-0.058	-0.060	-0.055
	(0.047)	(0.052)	(0.047)	(0.053)
Noninterest income / Operating income (Q2/2008)	-0.004	-0.028	-0.002	-0.030
	(0.040)	(0.050)	(0.041)	(0.051)
Equity capital / RWA (Q2/2008)	0.017	-0.038	0.019	-0.040
	(0.045)	(0.051)	(0.045)	(0.050)
Sale of common stock (Q3/2008 to Q1/2009)	0.177**	0.160**	0.173**	0.163**
	(0.079)	(0.077)	(0.080)	(0.077)
=1 if BHC received TARP	0.096	0.077	0.074	0.099
	(0.105)	(0.099)	(0.109)	(0.105)
Dividends / Net income (Q2/2008)	0.015	0.024	0.018	0.021
	(0.032)	(0.034)	(0.032)	(0.034)
Net income / equity capital (Q2/2008)	-0.083**	-0.187***	-0.090**	-0.181***
	(0.040)	(0.048)	(0.042)	(0.050)
Change in RWA (Q2/2009 to Q1/2011)		0.282***		0.286***
		(0.074)		(0.073)
Change in equity capital / RWA (Q2/2008 to Q1/2009)			0.026	-0.026
			(0.049)	(0.049)
Fed-district fixed effects	x	x	x	x
Observations	566	554	566	554

Table 3: The impact of ownership on the sale of common stock

This table reports results from a 2SLS regression at the BHC-level. 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 dependent variable is the total sale of common stock over the quarters Q2/2009 to Q1/2011, scaled by equity capital in Q2/2008. Standard errors are heteroskedasticity robust and reported in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)
		Panel A: Second stage		
Insider ownership	-0.087**	-0.077*	-0.084**	-0.083**
	(0.040)	(0.040)	(0.040)	(0.041)
F-Test of excluded instrument	555.607	535.835	554.658	536.188
		Panel B: First stage		
Predicted Insider ownership	0.830***	0.825***	0.828***	0.823***
	(0.035)	(0.036)	(0.035)	(0.036)
		Panel C: Reduced form		
Predicted Insider ownership	-0.072**	-0.064*	-0.069**	-0.068*
	(0.035)	(0.034)	(0.034)	(0.035)
Control variables	x	x	x	x
Ln(Risk weighted assets) (Q2/2008)	x	x	x	x
Deposits / Assets (Q2/2008)	x	x	x	x
Loans / Assets (Q2/2008)	x	x	x	x
Other earning assets / Assets (Q2/2008)	x	x	x	x
Income diversity (Q2/2008)	x	x	x	x
Noninterest income / Operating Income (Q2/2008)	x	x	x	x
Equity capital / RWA (Q2/2008)	x	x	x	x
Sale of common stock (Q3/2008 to Q1/2009)	x	x	x	x
=1 if BHC received TARP	x	x	x	x
Dividends / Net income (Q2/2008)	x	x	x	x
Net income / Equity capital (Q2/2008)	x	x	x	x
Change in RWA (Q2/2009 to Q1/2011)		x		x
Change in equity capital / RWA (Q2/2008 to Q1/2009)			x	x
Change in RWA (Q2/2009 to Q1/2011)		x		x
Fed-district fixed effects	x	x	x	x
Observations	493	482	493	482

Table 4: The impact of ownership on the sale of common stock - Heterogenous private benefits of control

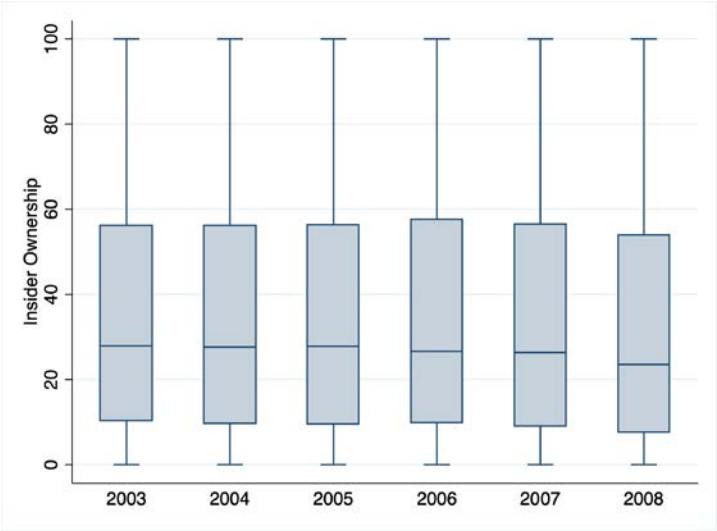
This table reports results from 2SLS regression at the BHC-level for different subsamples. The dependent variable in columns is the total sale of common stock over the quarters Q2/2009 to Q1/2011, scaled by equity capital in Q2/2008. All regression models include control variables as indicated. The analysis 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. The analysis in Panel C splits the sample between banks with branches in areas that experienced a drop in house prices during the Financial Crisis. The analysis in Panel D splits the sample between banks with a low/high, i.e. above sample median, share of MBS investment. 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 heteroskedasticity robust and reported in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Panel A: Level of insider lending							
	Low				High			
Insider ownership	-0.055	-0.041	-0.057	-0.051	-0.096*	-0.091*	-0.086*	-0.093*
	(0.066)	(0.063)	(0.067)	(0.066)	(0.053)	(0.052)	(0.051)	(0.052)
F-Ttest of excluded instrument	193.252	178.350	191.072	176.350	247.511	243.220	260.456	263.861
Observations	234	229	234	229	234	228	234	228
	Panel B: BHC's level of opacity							
	Low				High			
Insider ownership	-0.053	-0.038	-0.045	-0.038	-0.144*	-0.158**	-0.143*	-0.162**
	(0.044)	(0.047)	(0.045)	(0.048)	(0.074)	(0.069)	(0.074)	(0.070)
F-Test of excluded instrument	240.627	236.461	243.154	241.001	309.654	290.837	301.959	284.983
Observations	246	242	246	242	247	240	247	240

	Panel C: BHCs with activity in areas with drop in house prices							
	No				Yes			
Insider ownership	-0.031	0.009	-0.016	0.017	-0.159***	-0.167***	-0.159***	-0.180***
	(0.060)	(0.058)	(0.059)	(0.059)	(0.059)	(0.057)	(0.059)	(0.059)
F-Test of excluded instrument	129.736	130.597	129.433	131.818	334.366	316.940	335.552	320.871
Observations	158	157	158	157	312	302	312	302
	Panel D: BHC's MBS exposure							
	Low				High			
Insider ownership	-0.006	-0.006	-0.001	-0.002	-0.185**	-0.151**	-0.189**	-0.169**
	(0.042)	(0.042)	(0.042)	(0.043)	(0.079)	(0.063)	(0.079)	(0.067)
F-Test of excluded instrument	258.501	261.920	263.029	268.566	209.905	209.494	208.889	208.854
Observations	241	241	241	241	241	241	241	241
Control variables								
Ln(Risk weighted assets) (Q2/2008)	x	x	x	x	x	x	x	x
Deposits / Assets (Q2/2008)	x	x	x	x	x	x	x	x
Loans / Assets (Q2/2008)	x	x	x	x	x	x	x	x
Other earning assets / Assets (Q2/2008)	x	x	x	x	x	x	x	x
Income diversity (Q2/2008)	x	x	x	x	x	x	x	x
Noninterest income / Operating Income (Q2/2008)	x	x	x	x	x	x	x	x
Equity capital / RWA (Q2/2008)	x	x	x	x	x	x	x	x
Sale of common stock (Q3/2008 to Q1/2009)	x	x	x	x	x	x	x	x
=1 if BHC received TARP	x	x	x	x	x	x	x	x
Dividends / Net income (Q2/2008)	x	x	x	x	x	x	x	x
Net income / Equity capital (Q2/2008)	x	x	x	x	x	x	x	x
Change in RWA (Q2/2009 to Q1/2011)		x		x		x		x
Change in equity capital / RWA (Q2/2008 to Q1/2009)			x	x			x	x
Fed-district fixed effects	x	x	x	x	x	x	x	x

Figure 1: Evolution of insider ownership

The figures below plot the distribution of insider ownership over time. Panel A presents a box plot of insider ownership for each year from 2003 to 2008. The lower end of the box represents the first quartile of insider ownership, the upper end of the box represents the 75th percentile. Lines in the box indicate the median value of insider ownership in a year. Panel B presents a scatter plot of insider ownership in 2008 (y-axis) against insider ownership in 2003 (x-axis). The dashed line represents the linear fit.



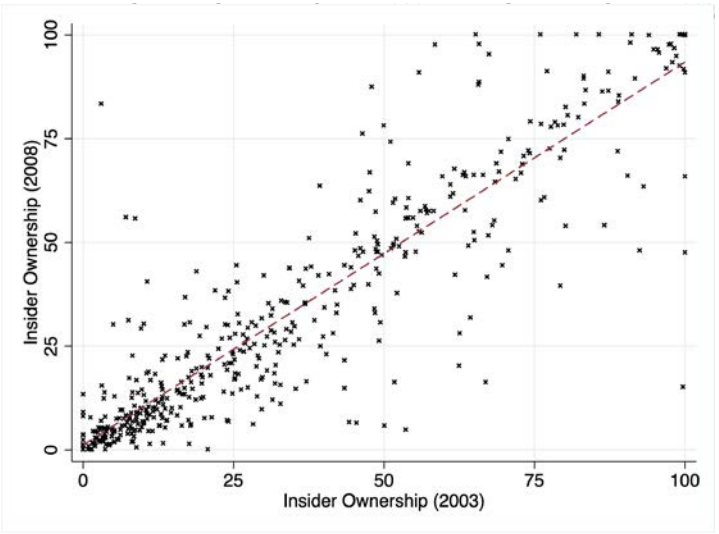
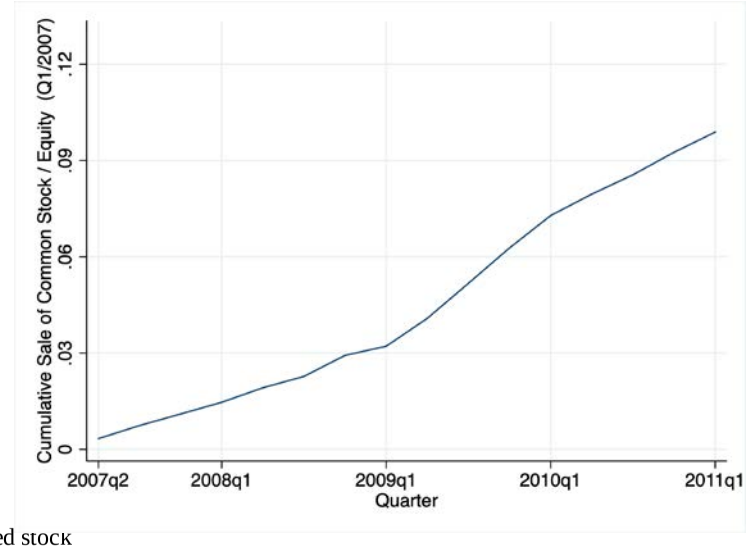


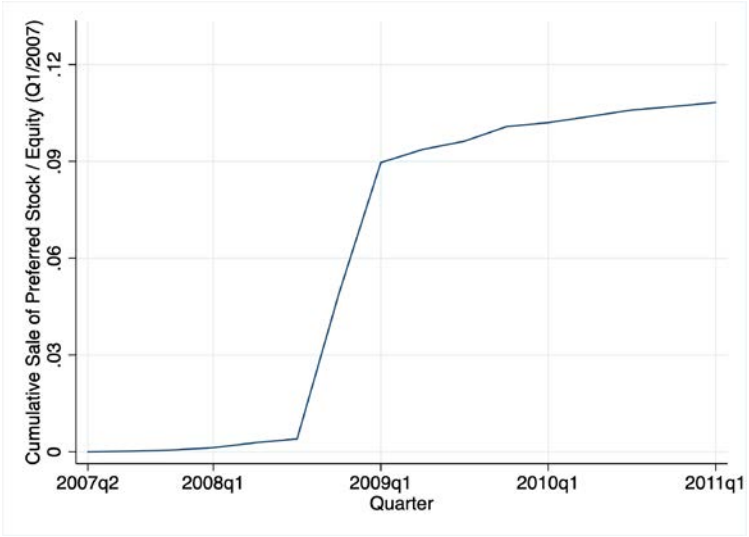
Figure 2: Cumulative sale of common stock/preferred stock and total stock over the period Q2/2007 to Q1/2011

The figures below plot the cumulative sale of common stock, preferred stock and total stock, scaled by equity caputal in Q1/2007 over the period Q2/2007 to Q1/2011.

Panel A: Sale of common stock



Panel B: Sale of preferred stock



Panel C: Sale of total stock

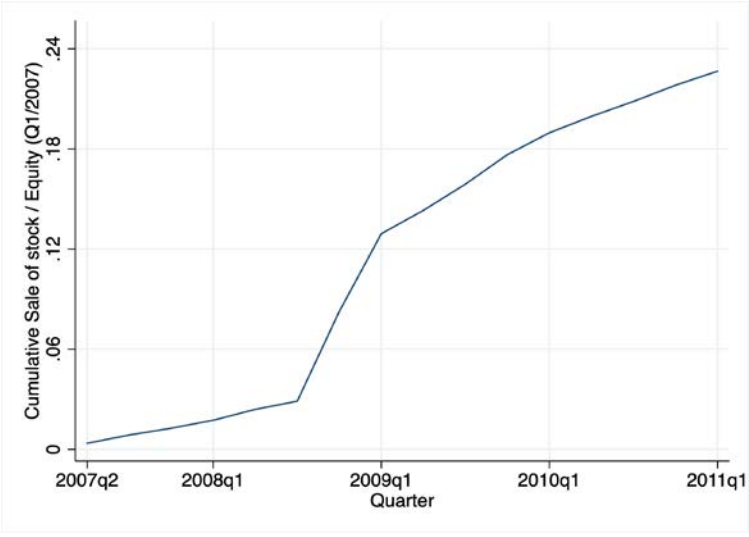


Figure 3: Sale of common stock by insider ownership

The figure plots the total sale of common stock over the quarters Q2/2009 to Q1/2011, scaled by equity capital in Q2/2008. We group BHCs into ten decile bins depending on their level of insider ownership and compute the average total sale of common stock for each bin. Dots represent the average total sale of common stock for BHCs in each bin.The dotted line represent the linear fit.

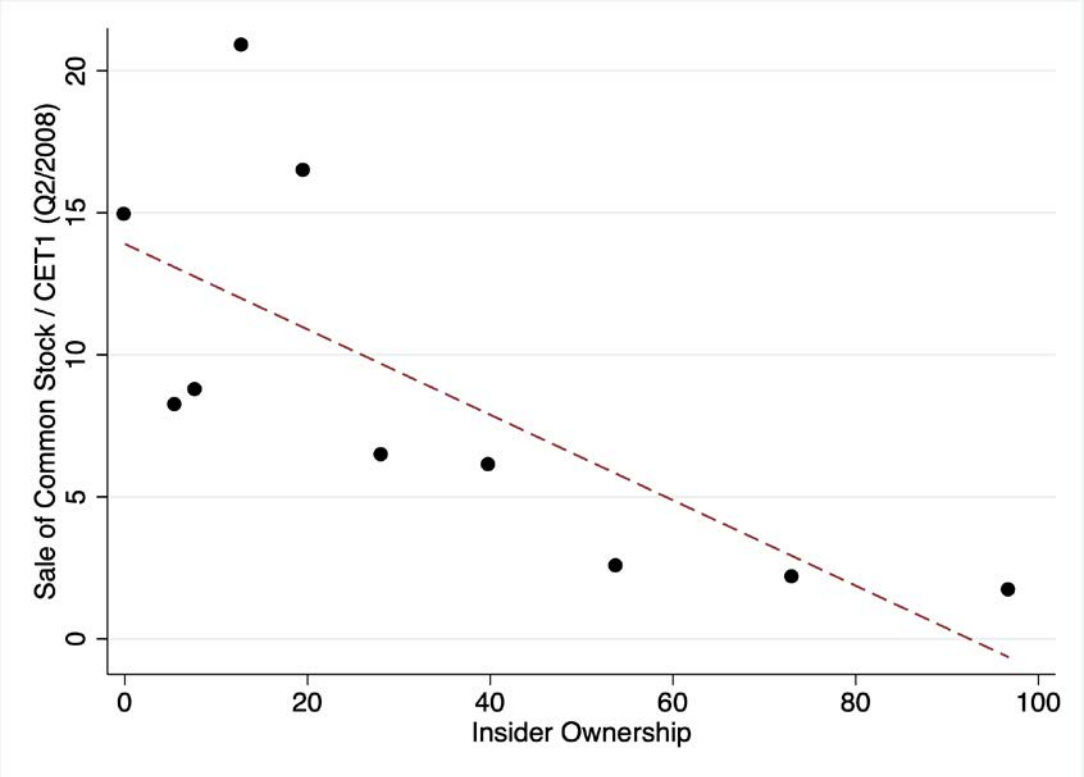


Figure 4: Differential effect on cumulative sale of common stock by insider ownership

The figure plots the differential effect of insider ownership on the cumulative sale of common stock over the quarters Q2/2007 to Q1/2011. The coefficients are obtained from a regression of the cumulative sale of common stock in a quarter, scaled by Equity Capital in Q1/2007 on a set of quarter fixed effects and the interaction of these quarter fixed effects with an indicator variable, taking on the value of one if insider share is above the sample median. The figure plots the coefficient on these interaction terms for all quarters as well as the 99 % confidence interval for each estimate where standard errors are heteroskedasticity robust.

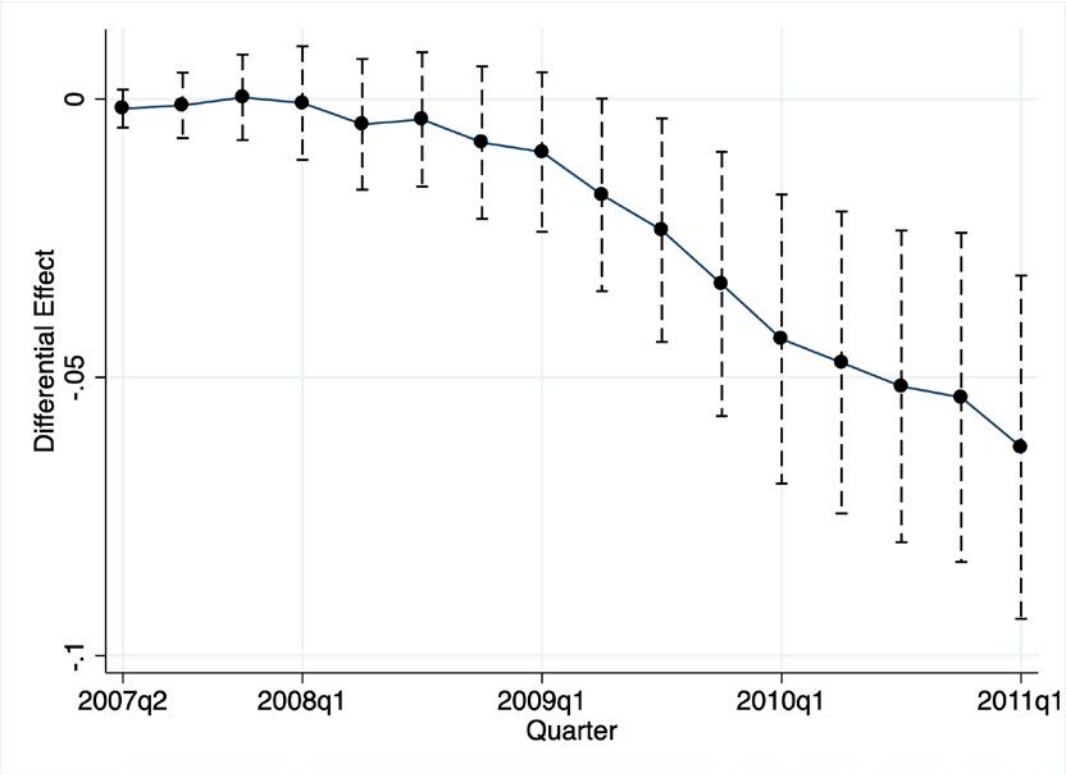


Table A1: Ownership (2003 value) and sale of common stock

This table reports results from an OLS regression at the BHC-level. Coefficients are standardized and represent economic magnitudes, i.e. the change in the dependent variable's standard deviation by a one st.dev. change in the independent variable. The dependent variable in all models is the total sale of common stock over the quarters Q2/2009 to Q1/2011, scaled by equity capital in Q2/2008. Insider ownership (2003) is the share of stock, held by insiders in 2003. Other control variables are defined in Table 1. Standard errors are heteroscedasticity robust and reported in parentheses below. *, **, *** mean significance at ten, five, and one percent, respectively.

	(1)	(2)	(3)	(4)
Insider Ownership	-0.079**	-0.073**	-0.075**	-0.073**
	(0.038)	(0.037)	(0.038)	(0.037)
Ln(Risk weighted assets) (Q2/2008)	0.154***	0.194***	0.149***	0.194***
	(0.047)	(0.047)	(0.048)	(0.047)
Deposits / Assets (Q2/2008)	0.009	-0.005	0.003	-0.006
	(0.038)	(0.040)	(0.037)	(0.039)
Loans / Assets (Q2/2008)	0.121**	0.111*	0.118**	0.111*
	(0.058)	(0.058)	(0.058)	(0.058)
Other earning assets / Assets (Q2/2008)	-0.010	-0.028	-0.008	-0.028
	(0.029)	(0.034)	(0.030)	(0.034)
Income diversity (Q2/2008)	-0.082*	-0.076	-0.091*	-0.077
	(0.047)	(0.054)	(0.048)	(0.053)
Noninterest income / Operating income (Q2/2008)	0.015	-0.000	0.021	0.001
	(0.041)	(0.054)	(0.042)	(0.054)
Equity capital / RWA (Q2/2008)	0.009	-0.048	0.014	-0.047
	(0.054)	(0.062)	(0.054)	(0.061)
Sale of common stock (Q3/2008 to Q1/2009)	0.107	0.095	0.100	0.094
	(0.070)	(0.076)	(0.072)	(0.076)
=1 if BHC received TARP	0.053	0.021	0.005	0.015
	(0.110)	(0.103)	(0.113)	(0.109)
Dividends / Net income (Q2/2008)	0.017	0.028	0.024	0.029
	(0.034)	(0.037)	(0.034)	(0.037)
Net income / equity capital (Q2/2008)	-0.099**	-0.202***	-0.115**	-0.204***
	(0.043)	(0.053)	(0.046)	(0.055)
Change in RWA (Q2/2009 to Q1/2011)		0.287***		0.286***
		(0.084)		(0.083)
Change in equity capital / RWA (Q2/2008 to Q1/2009)			0.055	0.007
			(0.053)	(0.053)
Fed-district fixed effects	x	x	x	x
Observations	492	482	492	482

Acknowledgements

We thank Dean Corbae, Terry Hendershott, Chen Lin, Sascha Steffen, and seminar participants at the Chicago Federal Reserve Bank, University of Münster, Vienna University, the Dutch Central Bank, for helpful comments, and Matteo Bagnara, Yangming Bao, Claudio Hantzsche, Florian Maisch, Fabian Nemeczek, Yuma Iwase and Mohammad Izadi for excellent research assistance. Goetz gratefully acknowledges financial support from the Center of Excellence SAFE, funded by the State of Hessen initiative for research LOEWE. The views expressed are our own and do not reflect those of the ECB or the Eurosystem.

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PDF ISBN 978-92-899-4511-0 ISSN 1725-2806 doi:10.2866/206869 QB-AR-21-002-EN-N