Institutional Investors, Insiders, and Bank Stability

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Abstract

We examine the association between ownership structure and bank stability using the March 2023 banking crisis as a natural experiment. We find that institutional investors, particularly hedge funds, reduced their holdings before the crisis, suggesting that they anticipated a market downturn. Conversely, bank insiders increased their ownership, indicating they did not use private information to exit ahead of the crisis. When examining performance following the revelation of the crisis, we find (i) negative associations between institutional ownership and bank stock returns, which are concentrated in banks with higher systematic risk and greater liquidity, (ii) banks with relatively high hedge fund ownership performed better, and (iii) the interaction between institutional and insider ownership is associated with better bank performance, i.e., the coexistence of both ownership types potentially has a stabilizing effect. These results highlight the complex link between ownership structure and financial stability in times of crisis.

Keywords: bank stability, institutional ownership, insider ownership, bank performance, financial crisis, hedge funds, investment advisors, bank risk, stock returns

1. Introduction

We examine how ownership structure relates to bank stability during a recent period of extreme instability. On March 8, 2023, Silvergate Bank announced its decision to liquidate, while Silicon Valley Bank (SVB) disclosed significant losses and plans to raise \$2.25 billion in new equity. SVB's stock price plummeted by 60% and the next day, depositors withdrew \$42 billion. On March 10, SVB was placed into receivership. At the time, these failures—with assets totaling \$209 billion and \$118 billion, respectively—were among the largest in U.S. history. Over this five-day period, the Keefe, Bruyette & Woods (KBW) Bank Index fell by more than 22%, intensifying concerns about the stability of the banking system both domestically and internationally.¹

This crisis highlighted long-standing concerns about banking fragility. Banks often hold illiquid assets financed by liabilities payable at par, making them vulnerable to sudden market shocks (e.g., Diamond and Rajan, 2001). This highly leveraged capital structure fosters liquidity provision, but even small changes in asset values can erode equity capital, triggering bank runs or failures.² A substantial body of work examines the role of regulation in mitigating banking sector fragility.³ We hypothesize that bank ownership, particularly by institutions and insiders, is associated with banking sector fragility, and we provide empirical evidence to support this.

¹ On March 10, Signature Bank experienced a run on approximately 20% of its deposits and was placed into receivership two days later. Silvergate Bank and Signature Bank failed due to concerns about cryptocurrency markets, whereas SVB's collapse resulted from investment losses driven by rising interest rates. On March 19, Credit Suisse Group AG was acquired by UBS Group AG for \$3.2 billion in a deal facilitated by the Swiss government and the Swiss Financial Market Supervisory Authority. This intervention aimed to prevent a broader financial crisis. Credit Suisse's failure stemmed from a general loss of confidence in the bank, although it had already been in a weakened position due to prior strategic and operational challenges.

² See Diamond and Dybvig, 1983; Diamond and Rajan, 2001; Holmström and Tirole, 1998.

³ This work includes the impact of uninsured depositors and regulators as bank monitors (Kandrac and Schlusche, 2021; Delis and Staikouras, 2011; Del Angel and Richardson, 2024; Maechler and McDill, 2006; Granja and Leuz, 2024; Chavaz and Slutzky, 2024) and different aspects of regulation, including deposit insurance (Keeley, 1990), capital (Berger and Bouwman, 2013; Flannery and Rangan, 2008; Vallascas and Hagendorff, 2013), and liquidity (Kashyap et al, 2002; Bonner, and Eijffinger, 2016; Sundaresan and Xiao, 2024).

A fundamental tension exists in the role of institutional investors during periods of financial stress. On one hand, institutional investors can enhance stability through monitoring and engagement with management, potentially limiting excessive risk-taking (Cheng et al., 2010). On the other hand, they may contribute to market instability through two channels. First, their tendency to herd can amplify price movements (Boyson et al., 2010, Dasgupta et al., 2011), and their preference for liquid assets may lead to "fire sales" during periods of market stress (Erkens et al., 2012; Scholes, 2000). Second, institutional owners might encourage bank risk-taking due to shareholders' option-like payoffs (Merton, 1977). This is particularly relevant in the banking industry, where high leverage and government guarantees contribute to inherent fragility.

We also analyze two potential effects of insider ownership on bank stability. First, managerial ownership can mitigate excessive risk-taking (e.g., Laeven and Levine, 2009), thereby enhancing financial stability. Second, insiders might sell in anticipation of stock price declines, raising concerns about their role during crises.⁴ It remains an open empirical question as to how institutional and insider ownership influence financial fragility during crises.

To test these relationships, we leverage the March 2023 crisis as a natural experiment to assess how ownership structure is associated with bank stability. Unlike the 2008 financial crisis or market disruptions during COVID-19, this event was a rapid-onset, banking-specific shock, allowing us to examine how different ownership types might mitigate or amplify banking sector

⁴ The Justice department and the SEC investigated the sale of stocks by Greg Becker and Daniel beck, the CEO and CFO of Silicon Valley Bank on Feb 27, two weeks before the collapse of the bank. Becker exercised options on 12,451 shares and sold them the same day. The price of SVB was 285.9, so this transaction amounts to \$3.5 million. Beck sold 2,000 shares (he owned 3374), for about \$572,000.

instability. In doing so, we investigate several key research questions: 1) How did institutional investor ownership change in response to the emerging banking crisis? 2) How were changes in institutional ownership related to stock prices? 3) Did insiders exit their positions during the crisis? and 4) How was the interaction between insider and institutional ownership associated with bank stock price performance?

Our work relates to several recent studies examining bank stability. De George et al. (2023) find that the presence of institutional owners, particularly short-term and high-turnover investors, is associated with measures of tail risk comovement. Research focusing on the 2023 crisis includes Cipriani et al. (2024), who identify uninsured deposit concentration and unrealized losses on held-to-maturity securities as key drivers of bank runs. They also show that stock price declines were linked to the deposit outflows they examined. Consistent with these findings, Choi et al. (2023) also report a relationship between stock returns and the interaction between uninsured deposits and unrealized losses. After controlling for uninsured deposits, Imbet et al. (2023) report that banks with higher pre-run Twitter activity experienced larger stock price declines, while Benmelech, Yang, and Zator (2023) find banks with lower branch density suffered greater stock price declines.

We contribute to the literature on financial institutions and market stability in several key ways. First, we provide a comprehensive analysis of institutional ownership dynamics during a rapid-onset banking crisis. Second, we enhance the understanding of institutional investor heterogeneity by documenting how different types of institutional investors—hedge funds, investment advisors, banks, and insurance companies—vary in their trading behavior during periods of market stress. Third, we contribute to the debate on insider ownership by examining whether bank insiders use their information advantage during crisis periods, providing new evidence on the relationship between insider ownership and bank stability. Fourth, we extend the literature on bank governance by showing how the interaction between insider and institutional ownership is associated with bank performance during periods of market stress.

Our analysis yields several important findings. First, institutional investors began exiting their positions before the full impact of the March 2023 banking crisis materialized, with early divestment concentrated in riskier and more liquid bank stocks. The negative correlation between institutional ownership and bank performance was most pronounced in banks with higher systematic risk and greater liquidity. Second, we find significant heterogeneity across investor types. Hedge funds reduced their holdings more aggressively prior to the crisis, yet banks with higher hedge fund ownership performed relatively better during the crisis—consistent with hedge funds being informed investors. Third, contrary to concerns about informed trading, insiders increased their holdings on average, suggesting they did not systematically exit in anticipation of stock price declines. Finally, we find that the combination of insider and institutional ownership is associated with better bank performance during the crisis, suggesting potential complementarities between these ownership types in stabilizing banks during periods of market stress.

Our analysis offers insights into how institutional investor heterogeneity is associated with ownership changes following signals of financial instability and how ownership is associated with bank performance during crises. By analyzing ownership patterns before and during the March 2023 bank failures, we provide further evidence on the role of institutional investors as stabilizers or amplifiers of financial turmoil, and whether insiders acted on private information to reduce their exposure before declines in bank performance. Our findings suggest that, in aggregate, institutional investors contribute to financial sector instability. However, important differences exist across different types of institutions. Our analysis also indicates that insider ownership can play a moderating role in the negative association between institutional ownership and bank performance. The following sections present our theoretical framework, empirical approach, and key findings, and offer a deeper examination of the links between ownership structure and banking sector stability.

2. Background, literature review, and hypotheses development

2.1. Institutional investors as monitors

Given bank fragility, monitoring management is particularly important in the banking industry. Of course, banks are subject to considerable regulatory oversight, yet Eisenbach et al. (2022) argue that regulators are limited in what they can do. Similarly, depositors' ability to monitor banks is weakened by the existence of deposit insurance and the expectation of government bailouts in the event of bank failure. As a result, we focus on two other monitoring and alignment mechanisms: institutional and insider ownership.

A rich body of work suggests that institutional investors actively monitor portfolio firms, and their engagement can help mitigate agency problems between managers and shareholders.⁵ However, institutional investors might also simply exit their positions in the face of poor (actual or expected) performance (Parrino, Sias, and Starks, 2003). There is also considerable heterogeneity in investment strategies and the propensity to monitor among institutional investors. For example, Brickley et al. (1988) and Ferreira and Matos (2008) find evidence that mutual fund managers and investment advisers are more effective monitors than bank trusts, insurance companies, and institutions with potential business ties to portfolio firms.

Similar themes have been explored in the context of the 2008-2009 Global Financial Crisis (GFC), (Beltratti and Stulz, 2012; Diamond and Rajan, 2009; Erkens et al., 2012). In this earlier

⁵ See Gillan and Starks (2002), Grinblatt and Titman (1989, 1993), Chen, Jegadeesh, and Wermers (2000), and Bennett, Sias, and Starks (2003).

setting, Song and Wang (2020) report that banks and insurance companies reduced their investments in banks with greater exposure to securitized assets but increased their investments in banks with safer mortgages before the crisis. They conclude that banks and insurance companies were more informed about the banking sector than independent institutions such as investment companies and pension funds. Prior research also suggests that hedge funds are particularly well-positioned to act as effective monitors (e.g., Brunnermeier and Nagel, 2004; Chen, Kelly, and Wu, 2020). As a result, we propose the following hypotheses:

H1: Better-informed institutional investors exited relatively more fragile banks *prior* to the distress period.

H2: There is a positive association between continued ownership by better-informed institutional investors and bank performance during periods of distress.

H3: There is variation in the association between institutional investor ownership and bank performance before and during periods of distress based on institutional investor type.

Two other strands of the literature suggest that banks with greater institutional ownership might perform worse during a crisis. We now discuss these alternatives.

2.2. Alternative hypotheses on the role of institutional investors

Since shareholders effectively own a call option on the firm, institutional investors may also encourage managerial risk-taking (Merton, 1977). Empirical research examining institutional ownership and managerial incentive structures in industrial firms supports this view (e.g., Hartzell and Starks, 2003).Saunders et al. (1990), Laeven and Levine (2009), and Ellul and Yerramilli (2013), Falato and Scharfstein (2023), among others, provide evidence that institutional investors encourage bank risk-taking. Similarly, Erkens et al. (2012) report that financial firms with higher institutional ownership experienced poorer stock performance during the 2007–2008 financial crisis due to increased risk-taking prior to the crisis. Consistent with this, De George et al. (2023)

find that institutional ownership is associated with tail risk comovement, particularly among shortterm, high-turnover investors, suggesting that institutional ownership can amplify systemic risk in times of market stress. Hartzell and Starks (2003) and Cheng et al. (2010) find that institutional ownership is associated with managerial compensation structures that promote risk-taking in industrial firms and banks, respectively. Consistent with Merton's view, we argue that, all else being equal, banks with greater institutional ownership are likely to perform relatively worse during financial crises.

H4A: Institutional investor ownership is negatively associated with bank performance during distress periods through a risk channel.

Institutional investor trading can also influence stock prices and price volatility (Gabaix et al., 2006). Moreover, during periods of large price declines, Stein (2009) argues that highly leveraged investors incur losses and, if forced into a "fire sale," the liquidation of holdings further depresses security prices. The potential price impact of institutional investor trading is exacerbated by their tendency to trade in the same direction (e.g., Celiker et al., 2015; Dasgupta et al., 2011).

During market turmoil, Cella et al. (2013) report that stocks with greater holdings by short-horizon investors experience higher selling pressure and larger price declines relative to those held predominantly by long-horizon investors. Similarly, Manconi et al. (2012) find that bond mutual funds liquidated portions of their portfolios during the 2007–2008 financial crisis due to liquidity needs. As the liquidity of securitized bonds dried up, these funds sold liquid corporate bonds, transmitting the crisis from securitized bonds to corporate bonds. In contrast, institutions with longer-term investors and penalties for early withdrawal, such as insurance companies and pension funds, faced less pressure to sell and were net purchasers of corporate bonds.

More recently, Glossner et al. (2021) report that non-financial firms with relatively greater institutional ownership performed worse during the COVID-19 outbreak. They argue that large

investors faced sudden increases in redemptions and, as a result, engaged in "fire sales" to reduce their risk exposure. The evidence that institutional investors, through their trading, affect prices and volatility suggests that declines in their holdings are associated with worse bank performance during periods of financial distress. Thus, we hypothesize:

H4B: Larger declines in institutional investor ownership are associated with worse bank performance during distress periods, particularly for more liquid stocks.

2.3. Insider ownership

Laeven and Levine (2009) argue that bank managers resist investor pressure to increase risk because doing so can (i) diminish their private benefits of control and (ii) reduce the value of their firm-specific human capital. Given that bank insiders are likely better informed about the firm's prospects, concerns have been raised that they may have sold their holdings in anticipation of stock price declines. Prior research on insider trading during the Global Financial Crisis (GFC) presents mixed evidence regarding the role of insiders during distress periods. Fahlenbrach and Stulz (2011) find that bank CEOs did not sell before the onset of the GFC and, as a result, suffered significant wealth losses. In contrast, Bhagat and Bolton (2019) report a negative association between CEO stock sales and subsequent bank operating performance during both the GFC and other periods. Similarly, Cziraki (2018) finds that insider trading at banks in 2006 predicted stock market performance during the financial crisis. Moreover, insiders at banks with high exposure to the housing market were more likely to sell stock than those at low-exposure banks.

We propose the following hypothesis:

H5A: Bank insiders reduced their ownership positions ahead of the crisis period, with larger reductions in the worst-performing banks.

At the same time, executive ownership has the potential to mitigate agency problems and signal managerial quality or, alternatively, lead to managerial entrenchment (Jensen and Meckling, 1976; Leland and Pyle, 1977). Stulz (1988) specifically predicts a non-linear relationship between insider ownership and firm value, a view supported by several studies (e.g., Wruck, 1989; McConnell & Servaes, 1990).

Consistent with Laeven and Levine (2009), Goetz et al. (2020) find that greater insider ownership is associated with lower equity issuance during the 2007-2009 financial crisis, suggesting that insiders were reluctant to dilute both their ownership and private benefits of control. Holderness et al. (1999) and Calomiris and Carlson (2016) report a negative relationship between managerial ownership and risk-taking, while Fortin et al. (2010) find that banks with greater managerial control took less risk in the years leading up to the 2007-2009 financial crisis. Additionally, Bhagat and Bolton (2019) report that bank director stock ownership is positively related to bank performance and negatively related to risk, both before and during financial crises. As a result, we hypothesize:

H5B: Increased insider ownership is positively associated with bank performance during distress periods.

3. Sample construction and sample characteristics

3.1. Sample construction

We obtain ownership data from Bloomberg. Specifically, we collect 92,133 ownership reports filed by 483 U.S. banks listed on North American stock exchanges prior to March 7, the start of the period of distress. We exclude 12 banks whose most recent proxy statement was prior to October 1, 2022, as their insider ownership information is outdated. Information about other bank characteristics is collected from a combination of Bloomberg and S&P Capital IQ. We are

able to obtain complete information about ownership and bank characteristics for 463 publicly traded banks. Appendix 1 provides details about the types of ownership reports available in Bloomberg.

3.2. Data and sample characteristics

We incorporate bank characteristics that prior studies have identified as relevant in explaining bank performance during periods of distress. These characteristics capture elements of assets, liabilities, capital adequacy, performance, risk, and market liquidity. As in the existing literature, we include multiple variables within these broad categories. Our primary multivariate analysis (discussed further below) presents results for a more parsimonious specification, while robustness tests include additional covariates. Table 1 lists the specific variables in each category along with the rationale for their inclusion in the analysis.

The summary statistics in Table 1 indicate that the average bank in our sample has \$39 billion in assets (median: \$2.5 billion) and experienced 67% asset growth over the five-year period 2018–2022. About 20% of assets are liquid, with approximately 2% invested in U.S. Treasury securities. Loans and leases constitute 69% of total assets, with 77% of loans secured by real estate. Deposits account for 82% of total assets and are primarily core deposits. The banks in our sample appear relatively well-capitalized, with an average equity-to-assets ratio of 9.6% and a leverage ratio of 10%. The average return on equity (ROE) is 12%, and the average efficiency ratio is 55%. Finally, uninsured deposits comprise approximately 45% of total domestic deposits.

3.3. Institutional Ownership

Table 2, Panel A reports univariate statistics on insider and institutional ownership. The average (median) number of institutional owners per bank is 196 (90), owning an average of 41% (40%) of the outstanding equity. On average, 12.9 insiders hold 6.7% of outstanding equity.

Panel B reports ownership by the different types of institutions, as classified by Bloomberg. Investment advisors have an average ownership of 29%. The "big-three" largest investment advisors (BlackRock, State Street, and Vanguard) account for 26% of all investments by institutions. Hedge Funds own 4.3%, other Banks 2.5%, Brokerage Firms 1.7%, Insurance Companies 1.4%, and Private Funds 1.3%. Other types of institutions own, on average, less than 1% of banks' equity.

4. Changes in institutional and insider ownership before March 8

We hypothesize (H1) that, all else being equal, better-informed institutional investors would exit relatively more fragile banks before problems at Silvergate and SVB became public on March 8. Additionally, concerns about insider trading suggest that insiders may have sold shares before issues at certain banks were disclosed. This leads us to hypothesize (H5A) that insiders would exit weaker banks before March 8.

To test these hypotheses, we analyze changes in the percentage ownership across deciles of bank stock returns from March 8 to March 13. These changes are based on information from ownership reports filed from October 1, 2022, to March 7, 2023. The values in Table 3 suggest that institutions anticipated a drop in the value of their investments in banks (H1): their ownership declined by 6.42%. This decline was notably larger for poorly performing banks, with a 10.5% reduction for banks in the lowest return decile compared to 5.7% for banks in the highest return decile.⁶ These findings align with De George et al. (2023) who find that short-term, high-turnover institutional investors tend to engage in correlated trading behavior, which can exacerbate financial

⁶ Measuring ownership changes by the number of shares, we find that insiders increased their ownership by 2.25 million shares, while institutional investors were net sellers of 46 million shares. Among institutional investors, investment advisors, hedge funds, and insurance companies were net sellers, whereas banks and brokerage firms were net buyers.

fragility. This systemic herding effect may have played a role in the pre-crisis ownership reductions we document, as institutions sought to reduce exposure to vulnerable banks before the distress period.

Our results do not support hypothesis H5A: We find no evidence that insiders sold their holdings in anticipation of a stock price decline. On average, contrary to concerns about insider trading, insiders increased their ownership in banks by 6.34%. This increase was observed in both the best- and worst-performing banks during the crisis.

4.1. Institutional investor ownership changes

Hypothesis 1 posits that better-informed institutions would have exited relatively fragile banks before the distress period. While the theoretical foundation for this hypothesis is well-established, empirically identifying which investors are better informed presents a challenge. In this section, we employ three alternative approaches to proxy for institutional information and examine whether these differences correlate with changes in ownership.

4.1.1 Ownership changes by institutional investor type

One way to identify which institutions are better informed is to link their access to information with their potential monitoring efforts. Prior studies, as discussed above, suggest that there are significant differences in monitoring effort or ability among various types of institutions (Brickley et al., 1988; Ferreira and Matos, 2008; Song and Wang, 2020). Brunnermeier and Nagel (2004) and Chen et al (2020) suggest that hedge funds are particularly well-positioned to act as effective monitors. Bloomberg categorizes institutional investors into 18 different types. However, we focus on the five types with an average ownership above 1% and a median ownership greater than 0%: investment advisors, hedge funds, banks, brokerage firms, and insurance companies.

On average, all institutional investor types reduced their ownership positions before the crisis. Table 3 shows that investment advisors, banks, and insurance companies decreased their ownership more significantly in banks that ultimately performed poorly than in those that fared better during the crisis. Consistent with the view that hedge funds exert more monitoring than other investors, hedge funds experienced the largest reduction in ownership in banks before March 8. However, this reduction was similar in magnitude across both the best- and worst-performing banks, suggesting that hedge funds anticipated a general industry downturn rather than declines at specific banks.

4.1.2 Investors holding significant equity stakes in banks

A second approach to proxying investor information is to examine the size of the investment, as larger stakes in a firm should incentivize greater monitoring (e.g., Ferreira and Matos, 2008). If access to information about banks is linked to monitoring efforts or incentives, institutions with larger ownership stakes should be better informed and more likely to exit underperforming banks at a higher rate compared to investors with smaller stakes.

To test this, we compare ownership changes between institutions holding at least 1% ownership (top decile) and those with less than 1%. The results in Online Appendix Table 1 contradict our expectations: institutional investors in the low-ownership group reduced their bank holdings by 6.6%, whereas those with more than 1% ownership decreased their holdings by only 2.8%. Additionally, all institutions with ownership above 1%—except for banks—reduced their stakes to a lesser extent than other institutions. Furthermore, we find no significant differences in ownership changes between the highest- and lowest-return deciles of banks.

4.1.3 Ownership changes among the big-three investment advisors and big-three hedge funds

Large institutional investors can be more effective monitors due to their direct access to management (Brav et al., 2008; Brav et al., 2024). If this access provides better information about banks, large institutions should reduce their holdings before significant value declines more than smaller institutions. Additionally, more effective monitoring by large investors should lead to better stock performance for banks during a crisis.

To evaluate these perspectives, we compare ownership changes among the big-three fund families—BlackRock, State Street, and Vanguard—as discussed in Brav et al. (2024). Together, these funds accounted for 38.3% of the total investment advisor ownership. Before March 8, the big-three increased their ownership by 1.5%, while smaller investment advisors reduced their ownership by 6% (untabulated). This suggests that the big-three investment advisors increased their holdings in nine out of ten return deciles, whereas smaller institutional investors reduced their ownership across all deciles.

We find similar patterns when examining ownership changes among the three largest hedge funds—Millennium Management, Citadel, and Renaissance Technologies. Combined, these funds represented 24% of total hedge fund ownership. The big-three hedge funds increased their average bank ownership by 4.6%, while other hedge funds reduced their holdings by 6.7%. Table 2 in the Online Appendix shows that the big-three hedge funds increased their ownership in the worstperforming banks, whereas other hedge funds reduced their ownership across all return deciles. One possible reason why large investors did not reduce their ownership in the worst-performing banks as much as other investors is their broad holdings across many banks. For instance, Vanguard had investments in 84% of the banks in the sample. These large investors may have less incentive to closely monitor any single bank compared to investors with more concentrated ownership.

4.1.4 Robustness: ownership changes during the two months leading up to March 8

The analyses conducted thus far rely on ownership reports filed between October 1, 2022, and March 7, 2023. While this five-month period is shorter than those used in other studies, a more condensed interval may provide a clearer snapshot of ownership changes leading up to the crisis.⁷ To further examine this, we replicate our analysis using 8,687 ownership reports filed between January 7 and March 7.

The results in Table 3 of the Online Appendix align closely with our initial findings. Insiders increased their ownership before the crisis, suggesting that, on average, they did not leverage private information to exit their positions before the downturn. In contrast, institutional investors were net sellers, with investment advisors, hedge funds, and banks reducing their holdings—particularly in the worst-performing banks.

It is important to acknowledge a key limitation of this alternative analysis. The sample represents approximately 10% of all ownership changes that occurred during this two-month window. The majority of ownership changes from this period were reported on March 31.⁸ However, incorporating data from reports filed on March 31 could lead to misleading conclusions, as these reports also include transactions that took place after the crisis had already begun.

5. Ownership and bank stock performance during the crisis

In this section, we examine the relationship between ownership structure and bank stock performance during the crisis to test Hypotheses H2–H4. The literature presents two contrasting perspectives on this association. If institutional investors are better informed than other market participants and/or contribute to bank stability through effective monitoring, we would expect a

⁷ For instance, Parrino et al. (2003) analyze changes in institutional ownership during the two-year period preceding a forced CEO turnover, while Song and Wang (2020) examine institutional trading in the four quarters leading up to the 2007–2009 financial crisis.

⁸ See Appendix A for a discussion of the ownership reports.

positive relationship between institutional ownership and stock performance. Conversely, if institutions concentrated their investments in riskier banks and/or exited their positions following the emergence of financial distress, this could exert downward pressure on stock prices, resulting in a negative association. This aligns with prior research showing that institutional ownership is associated with increased tail risk comovement, particularly when dominated by short-term, high-turnover investors (De George et al., 2023).

To test these hypotheses, we categorize the sample of 463 banks into institutional ownership deciles and analyze stock returns for the period from Wednesday, March 8, to Monday, March 13. Consistent with H3, Table 4, Panel A demonstrates a monotonic decline in average returns, ranging from -5.6% in the lowest decile to -26% in the highest decile of institutional ownership. This suggests that banks with greater institutional ownership experienced more significant stock price declines during the crisis.

In contrast, our findings do not support Hypotheses H4A or H4B. As shown in Table 4, Panel B, we find no clear association between insider ownership and stock returns.

5.1. Insider ownership, institutional ownership, and stock returns: univariate analysis

As discussed in the previous section, prior studies suggest that different types of institutional investors vary in their monitoring effectiveness, which could influence bank performance during periods of distress. To assess this relationship, we examine stock returns across deciles of ownership by different types of institutional investors.

Panel C of Table 4 presents the results, showing a general decline in stock returns as institutional ownership increases. However, we find no clear evidence that ownership by specific types of institutions was significantly associated with performance during the crisis. Across all institutional

investor categories, average returns decline monotonically from the lowest to the highest ownership deciles. To formally test for differences in performance, we conduct t-tests comparing the average returns of banks in the highest (tenth) and lowest (first) institutional ownership deciles. The results indicate that we can reject the null hypothesis of equal returns across these groups, suggesting that higher institutional ownership is associated with worse performance. However, this effect appears consistently across different types of institutional investors, with no single category exhibiting a disproportionately strong association.

These findings suggest that institutional ownership, regardless of investor type, did not provide a stabilizing effect during the crisis. Instead, greater institutional presence was associated with larger stock price declines, possibly due to institutions exiting their positions in response to deteriorating market conditions.

5.2. Insider ownership, institutional ownership, and stock returns: multivariate analysis In this section, we estimate Equation (1) to investigate the association between returns and institutional ownership after controlling for bank characteristics.

Returns = f(Ownership, Assets, Liabilities, Capital Adequacy, Performance, Other characteristics, Risk, Liquidity,) (1)

The dependent variable, *Returns*, represents the stock returns (in percent) from Wednesday, March 8, to Monday, March 13. The control variables are described in Appendix 1. All variables are winsorized at the 2.5th and 97.5th percentiles to mitigate the impact of outliers.

Our primary focus in Table 5 is on insider ownership and the interaction with institutional investor ownership. We include insider ownership and its squared term in columns (1) and (2). The specifications in columns (3)-(7) include the ownership stakes of each investor type that we examine. Table 5 shows that banks with higher Insider Ownership did not perform worse during

the distress period. If anything, some specifications indicate slightly better performance for banks with larger insider ownership, supporting the alignment of interests view. At the same time, while the point estimates are typically not significant, we do see a small significant negative coefficient on insider ownership squared in Model 8, consistent with potential entrenchment. Apart from Banks and Insurance Companies, the coefficients for other institutional investor types are negative and significant. In terms of the economic interpretation, the estimation in column 2 suggests that a one standard deviation increase in aggregate institutional ownership (30.25%) corresponds to a 2.6% decline in stock returns during the crisis period. When we include ownership by all institutional investor types in the same specification (column 8), the coefficients of Investment Advisors and Hedge Funds remain negative and statistically significant (p-value < 0.01), while the coefficients for Banks and Insurance Companies is positive and significant (p-value = 0.06). The non-negative coefficients for Banks and Insurance Companies in columns 5, 7, and 8 are broadly consistent with the view that these investors tend to be more risk-averse.

Focusing on the control variables, we find some evidence that larger banks performed worse during the crisis, as indicated by the consistently negative sign on the Large Bank indicator, though the statistical significance is marginal. Similarly, banks with higher asset growth over the five years preceding the crisis generally experienced significantly worse returns during the distress period. This pattern suggests that banks that pursued rapid asset growth may have adopted riskier strategies. Supporting this interpretation, unreported results indicate a positive correlation between asset growth and several proxies for bank risk. Furthermore, banks with larger uninsured deposits, greater reliance on wholesale funding, higher systematic (beta) risk, and increased loan concentration exhibited consistently lower returns during the crisis—findings that align with riskbased explanations (e.g., Berger and Bouwman, 2013). In contrast, we see some evidence of slightly poorer performance for banks with smaller bid-ask-spreads, which is consistent with the notion that investors are more likely to exit more liquid stocks, thereby exerting greater downward price pressure.

5.3. Large individual institutional holdings and stock market performance

In the previous section, we argued that monitoring efforts should increase with the size of an institutional investor's holdings in a given bank. This argument is based on the premise that larger institutional stakes create stronger incentives for monitoring and governance, as these investors have more at stake and are more likely to engage with management to protect their investments. Supporting this view, Table 6 shows that banks with larger institutional ownership stakes performed better during the crisis period. Specifically average stock returns are 2.75% and 3.62% higher for institutions with more than 1% and 5% ownership in banks, respectively.⁹ We also discussed how large institutions might have greater incentives to become informed, and thus their presence would be associated with better stock returns for portfolio firms. Consistent with this, Table 6 indicates that, on average, the big-three investment advisors experienced 3% better returns than other investment advisors, and the big-three hedge funds saw a 3.3% better performance than other hedge funds. However, we cannot conclusively determine whether these differences in stock returns are due to monitoring efforts or because large investors chose banks that were more resilient to problems in the banking industry.

We also expect that institutional investors who hold a larger number of bank stocks in their portfolios are more informed about the quality of the banks they invest in and the banking industry as a whole. As a result, their investments should perform better during periods of distress.

⁹ We also examined the portion of the investor's portfolio in a given bank and found similar results.

Consistent with this expectation, Table 7, Panel A shows a positive association between the number of banks an institution holds and stock returns across all types of institutions, except for insurance companies. Panel B further supports this finding by showing a positive relationship between total investments in banks and their stock performance. Taken together, these results suggest that institutional investors with greater specialization in the banking sector tend to invest in banks that perform better during crises. The effect is stronger for hedge funds than for investment advisors.

5.4 The interaction between insider and institutional ownership

Some authors argue that insiders can help mitigate shareholder pressure to take on greater risk (e.g., Laeven and Levine, 2009). To test this argument, we examine crisis-period returns and introduce interaction terms between institutional investor types and insider ownership into Equation (1). The rationale is that if insider ownership moderates shareholder-driven pressure for increased risk-taking, it should be reflected in lower risk exposure and higher stock returns during periods of distress. Supporting this hypothesis, Table 8 reports positive and significant coefficients for the interaction between insider ownership and institutional ownership. This suggests that, in the presence of institutional investors, insider ownership is associated with slightly better stock return performance during the crisis—both in aggregate (column 1) and across all investor types except brokerage firms (column 6).

6. Institutional ownership and crisis period performance: examining potential channels

The analysis in the preceding section reveals a negative association between institutional ownership and stock returns during the banking sector crisis. In Section 2, we propose two potential explanations for this finding. The first suggests that institutions either invest in riskier banks or encourage risk-taking, implying a positive correlation between institutional ownership and bank risk. The second explanation posits that institutional selling in response to negative news triggers a "fire-sale," exerting downward pressure on stock prices. While we cannot directly observe institutional trading during the crisis, prior research (e.g., Scholes, 2000; Ma et al., 2022) suggests that institutional trading activity during such periods is closely linked to stock liquidity. Thus, we anticipate that institutional trading during this crisis period correlates with stock liquidity.

We begin by analyzing the determinants of institutional ownership, specifically examining whether institutional investor holdings are linked to risk and liquidity. Next, we explore how these characteristics relate to the level of institutional ownership and its link to relative performance during the crisis.

6.1. Determinants of institutional ownership

Prior studies have documented a positive relationship between institutional ownership and risk in both banks and industrial firms (e.g., Bennett et al., 2003; Ellul & Yerramilli, 2013). Additionally, research shows that institutional investors tend to favor larger and more liquid firms (Gompers & Metrick, 2001). Our analysis in Table 9 confirms these findings, demonstrating that institutional ownership in banks is positively correlated with various measures of risk and liquidity. Specifically, institutional ownership exhibits a positive correlation with beta, the standard deviation of returns, the standard deviation of ROA, and the ratio of non-performing loans to equity. In contrast, it is negatively correlated with a measure of bank risk-taking and the probability of insolvency (Ln Z, where a higher value indicates lower risk). Furthermore, the correlations in Table 9 reveal a positive relationship between institutional ownership and stock liquidity. Institutional ownership is negatively correlated with the bid-ask spread and the ratio of return to volume, while positively correlated with the number of trading days, trading volume, and the volume-to-price ratio.

We estimate Equation (2) to examine the factors influencing institutional ownership:

Ownership = f(Assets, Liabilities, Capital Adequacy, Performance, Risk, Liquidity)(2)

The results of this estimation, presented in Table 10, indicate that institutional investors generally allocate more capital to larger banks and those with higher levels of risk and liquidity. However, notable differences emerge across investor types. Compared to investment advisors, hedge funds has lower ownership in larger banks, except in the case of very large banks, where their investment levels are larger. Additionally, there is no clear relationship between hedge fund ownership and bank systematic risk. Both hedge funds and investment advisors prefer banks with more liquid stocks, though the coefficients for various liquidity measures are generally larger for investment advisors, suggesting a stronger preference for liquidity.

6.2. Proxies for institutional investors' trading and stock returns

In Section 2, we argued that in a crisis setting, riskier and more liquid securities are likely to be sold first, leading to greater declines in their returns. Consistent with this intuition, our findings indicate that institutional investors prefer banks with more liquid stocks and higher systematic risk. Additionally, we observe that more liquid and riskier stocks underperformed during the crisis.

A direct analysis of institutional trading behavior would require detailed transaction data, which is unavailable. Therefore, we investigate this indirectly by examining (i) changes in ownership after the onset of the crisis and (ii) how stock return performance varies with the interaction between institutional ownership and measures of risk and liquidity.

6.3. Changes in ownership structure following March 8

We compute changes in ownership using reports filed between March 8 and March 31. An important caveat in this analysis is that institutional ownership data primarily comes from 13F

filings, which reflect changes in ownership over the entire first quarter of 2023—covering periods before, during, and after the onset of the crisis on March 8. Keeping this limitation in mind, Table 11, Panel A, shows that, on average, insiders increased their ownership by 6.4%, whereas institutional investors reduced their ownership by 7.9%.

With the exception of brokerage firms, all institutional investor types reduced their bank holdings. Moreover, the worst-performing banks during the crisis (those in the lowest return decile) experienced the largest ownership reduction, at -23%. While hedge funds displayed the largest average decline in bank ownership after the crisis began (10%), their divestment in the worst-performing banks was only 12%, compared to a 24% reduction by investment advisors. The largest ownership reductions in the worst-performing banks occurred among insurance companies (31%).

Of note, these changes exceed those reported during the 2007–2009 financial crisis. For instance, Ben-David et al. (2012) document that hedge funds reduced their equity holdings by approximately 6% during the Quant Meltdown in Q3 2007 and the Lehman Brothers bankruptcy in Q3 2008. They also find that, on average, mutual funds did not decrease their holdings. While our data do not allow us to test the impact of trading on returns directly, these findings highlight significant institutional divestment from the worst-performing banks during the crisis period.

We also examine ownership changes by the big-three investment advisors and the three largest hedge funds in our sample, based on reports filed after March 7. The largest investment advisors reduced their ownership stakes in the worst-performing banks by 5.6%, whereas smaller investment advisors decreased their equity holdings by 24.6% (Table 4 in the Online Appendix). In contrast, the three largest hedge funds increased their ownership in the worst-performing banks, while smaller hedge funds reduced their holdings. These findings suggest that the decline in bank

market values during the crisis was not driven solely by selling pressure from the largest mutual funds and hedge funds.

6.4. Risk, liquidity, and stock returns

As discussed earlier, the negative association between institutional ownership and stock returns may stem from institutions' risk preferences, and we find that riskier stocks performed worse during the crisis period under study. In Table 12, Panel A, we observe that more volatile securities (measured by beta) experienced greater declines in returns during the crisis, particularly those with larger institutional holdings—both in aggregate (first column) and across all investor types except insurance companies (last column).

The relationship between liquidity and trading behavior during a crisis remains a subject of debate in the literature. Prior research suggests that selling pressure from institutional investors affects stock prices by influencing liquidity (e.g., Gabaix et al., 2006; Dasgupta et al., 2011; Cella et al., 2013; Glossner et al., 2021). Some scholars argue that crises trigger a "flight to liquidity," leading institutions to be net buyers of banks with more liquid shares (e.g., Longstaff, 2004). Others, however, contend that investors prioritize selling more liquid assets first to minimize potential price impacts (e.g., Scholes, 2000). Empirical evidence from Ma et al. (2022) supports the latter view, showing that high-quality liquid assets faced net selling pressures during the COVID-19 pandemic.

We hypothesize that larger declines in institutional ownership will be associated with worse bank performance during distress periods, particularly for more liquid stocks. We test this hypothesis, again indirectly, by examining the association between institutional ownership and stock liquidity. We base this argument on studies showing that institutions have a preference for liquidity, as supported by the significant association between liquidity and ownership in our earlier analyses.

Overall, our results align with the view that institutional investors exited more liquid assets during the crisis. Specifically, the coefficients for institutional ownership are generally negative, while the coefficient on the *IO*Spread* interaction term is positive. That suggests that firms with greater institutional ownership and greater liquidity (as measured by a lower bid-ask-spread) experienced relatively worse stock returns during the distress period. This effect appears to be driven by hedge funds, banks, and brokerage firms, where the interaction terms are consistently positive and significant.

The results thus far are supportive of the following: 1) The institutional investors in our sample were net sellers during the distress period; 2) more liquid stocks performed relatively worse during the crisis, potentially due to institutions seeking to minimize price impact (Scholes, 2000); 3) institutional investors, particularly investment advisors, appear to have a preference for both risk and liquidity; 4) the negative association between stock performance and ownership by investment advisors, hedge funds, and brokerage investors is more pronounced for riskier and more liquid stocks.

While indirect, these results are broadly consistent with the view that institutional exits during a crisis are linked to liquidity and that ownership changes by several investor types were associated with worse stock price performance during the crisis period.

6.5. Differences between hedge funds and investment advisors

Several studies suggest that large institutional investors possess superior information or investment skills compared to other institutional investors (Agarwal et al., 2013; Aragon et al., 2013; Sias et al., 2015; Caglayan et al., 2018; Alldredge et al., 2022). Supporting this view, the

univariate analysis in Table 6 shows that, on average, banks had approximately 3% higher returns when held by the big-three investment advisors (Panel C) and the three largest hedge funds (Panel D) compared to smaller institutional investors.

To further investigate this relationship, we examine whether banks with greater aggregate ownership by these large institutions outperformed other banks. Online Appendix Table 5 presents the average returns for banks sorted into quartiles based on aggregate institutional ownership and hedge fund ownership. The results indicate that average returns decline as ownership increases, and there are no meaningful differences in returns between banks with higher ownership by the big-three investment advisors and hedge funds and those with smaller institutional investors. Thus, we find no clear evidence that banks with greater aggregate ownership by the largest institutional investors and hedge funds performed better than other banks.

At the same time, the results from prior sections reveal significant differences between investment advisors and hedge funds—the two types of institutions with the largest ownership positions in our sample. One key distinction is that, on average, hedge funds reduced their ownership by 13% before the crisis, double the 6% reduction by investment advisors (see Table 3). This suggests that hedge funds anticipated the crisis in the banking industry more effectively than investment advisors, aligning with prior research that argues hedge funds are generally better informed than other institutions (Brunnermeier et al., 2020).

Another important difference is the relationship between institutional ownership and systematic risk. While investment advisor ownership is positively associated with banks' systematic risk, no significant relationship exists between hedge fund ownership and these risk measures. Thus, after controlling for other characteristics, investment advisors—but not hedge funds—appear to prefer riskier banks (see Table 10). These fundamental differences suggest that,

all else being equal, banks with greater hedge fund ownership should have performed relatively better than those with higher investment advisor ownership during the crisis period.

However, isolating the specific monitoring influence of hedge funds on a bank that is also owned by other institutional investors is challenging. One way to assess the relative influence of hedge fund ownership is by computing the ratio of hedge fund ownership to total institutional ownership (*Hedge to IO*). If, as argued above, hedge fund ownership is positively associated with firm performance, we should observe a positive relationship between this ratio and stock returns. This is indeed what we find when we estimate Equation (1) augmented with the *Hedge to IO* variable. The results reported in Table 13 Model 1 and 2 (where we add bank characteristics) show that the coefficient of this variable is positive and statistically significant. Additionally, we identify banks with ownership by hedge funds in the 10th decile of the ratio *Hedge to IO* (corresponding to 47% of total institutional ownership) which we label *High Hedge Own*. Model 3 in Table 13 demonstrates that the average return for these banks is 8.8% larger than the average return of banks with lower levels of hedge fund ownership. When we incorporate bank characteristics into the model, the difference remains significant but decreases to 2.7%.

To provide further insights into the differences between investment advisors and hedge funds, we also identify 31 banks where hedge fund ownership exceeds that of investment advisors. Model 5 in Table 13 shows that these banks achieved, on average, 8% higher returns than others. While this performance gap narrows when controlling for bank characteristics, it remains statistically significant.

The preponderance of the evidence suggests that banks with relatively high hedge fund ownership outperformed others in the crisis period we examine. This result may reflect hedge funds' superior investment ability, or attributable to a strategy of investing in less risky banks.

7. Robustness

In previous sections, we employed a parsimonious model. In this section, we expand our analysis by incorporating additional variables. Our primary findings remain robust, and this extended analysis identifies some alternative proxies that are statistically significant. Appendix 1 provides definitions and data sources for these additional bank characteristics, and the regression specifications are detailed in Table 6 of the Online Appendix.

To capture different aspects of bank assets, we include i) the ratio of liquid assets to total assets, as banks with higher liquidity are better positioned to manage their balance sheets and are perceived as less risky by investors and depositors (Beltratti and Stulz, 2012), ii) the ratio of real estate loans to total assets, which reflects banks' exposure to the real estate sector — a key factor that adversely affected bank performance during the 2007–2009 financial crisis (e.g., Huizinga and Laeven, 2012), and iii) the ratio of core deposits to total deposits, as the former is viewed as a more stable source of financing.

As additional measures of efficiency, we consider (i) the efficiency ratio, a widely used measure of bank performance, and (ii) the market-to-book ratio, a measure of growth opportunities (e.g. Martin, 1996). For risk proxies, we include: (i) the standard deviation of the return on assets (ROA) (Laeven and Levine, 2009), ii) the ratio of nonperforming loans to equity, s higher levels of nonperforming loans signal greater risk to investors and depositors, and iii) the ratio of non-interest income to interest income, since non-interest income is positively correlated with total systemic risk (e.g., Brunnermeier et al., 2020).

We expand our analysis by incorporating alternative measures of liquidity: (i) the number of trading days (e.g., Han, 1995), (ii) the average and percentage bid-ask spread (e.g., Amihud and Mendelson, 1986), and (iii) the average ratio of the absolute value of daily returns to daily volume (Amihud, 2002). Additionally, we include an indicator variable, *Regional Banks*, as these banks were considered more vulnerable during the crisis, and we do not find evidence of this vulnerability in our sample. Appendix 1 provides definitions and data sources for these additional bank characteristics.

The robustness analyses, as detailed in the Online Appendix, reinforce our main findings. Overall, institutional investors favor larger banks and those with higher levels of systematic and total risks, measured by beta and the standard deviation of returns, respectively. Furthermore, institutional investors exhibit a preference for liquidity, as evidenced by positive coefficients for the *Ln Trading Days* and negative coefficients for the *Bid-Ask Spread* and *Return to Volume*. However, differences emerge when analyzing different types of institutions separately.

The extended regression specifications provide further evidence of a negative association between stock returns and ownership by both investment advisors and hedge funds during the distress period. This negative association is twice as large for investment advisors compared to hedge funds. Several new variables are found to be relevant in explaining the cross-section of banks' stock returns; notably, the number of trading days and the standard deviation of returns are negatively associated with the returns that we study.

8. Conclusions

Banks increased their capital and improved liquidity following regulatory tightening after the 2007-2009 financial crisis (e.g., Sarin and Summers, 2016). However, the March 2023 bank failures reignited concerns about banking sector stability. In this context, we examine bank ownership structure as a factor influencing financial stability.

We analyze changes in insider ownership and institutional investor holdings before the onset of the March 7, 2023 financial crisis and document several key findings. First, institutional

investors reduced their bank holdings before the crisis, with a more pronounced decline in banks that later performed poorly. Our analysis of bank stock performance shows that banks with higher institutional ownership experienced worse stock returns during the crisis. Moreover, this negative association was stronger for riskier and more liquid banks.

Second, we find significant variation in the associations with institutional investor heterogeneity. Hedge funds appeared to anticipate the crisis, reducing their holdings by 13%—twice the reduction of investment advisors. Both investment advisor and hedge fund ownership exhibited the strongest negative association with crisis-period returns. However, banks with relatively high hedge fund ownership performed better during the crisis.

Third, regarding the potential channels driving these relationships, our analysis shows that institutional investors tend to hold riskier, more liquid bank stocks, and the preponderance of the evidence suggests both a risk channel (institutions invest in riskier banks) and a trading pressure channel (institutional selling exacerbated price declines). Additionally, the negative relationship between institutional ownership and poor performance was stronger for more liquid stocks, consistent with fire-sale effects documented in prior work.

Fourth, our analysis of insider ownership reveals that, contrary to concerns about informed trading, insiders increased their holdings before the crisis. Moreover, when examining the interaction between insider and institutional ownership, we find evidence of improved bank performance. This supports prior research suggesting that insider ownership helps mitigate shareholder pressure for excessive risk-taking.

While our findings suggest that institutional investors' preference for riskier banks and their trading behavior during crises could exacerbate financial sector instability, a more detailed analysis of institutional ownership heterogeneity —and, if possible, a more granular examination of how different institutions traded during the crisis —would help inform policymakers and provide deeper insights into direct and causal links between institutional ownership, trading dynamics, and bank stability.

Appendix A: Ownership data

Ownership reports have varying reporting deadlines. For insider trading, SEC Forms 3, 4, and 5 must be filed within 10, 2, and 45 days, respectively. In contrast, 13F forms—covering 59% of our sample—are submitted within 45 days after the quarter's end, with banks typically filing at the deadline. Consequently, 13F reports for Q4 2022 were filed in mid-February 2023, while Q1 2023 reports appeared in mid-May. Since May filings capture ownership changes both before and after the banking crisis, they cannot be used to analyze pre-crisis shifts. Instead, we rely on 13F reports to assess ownership changes in Q4 2022 but exclude them for the January 1–March 8 period.

In the two months preceding the crisis, institutional investors primarily filed MF-AGG (65.5%) and ULT-AGG (29.9%) forms, while insider ownership was most frequently disclosed through Form 4 (73%) and proxy statements (24.3%).

Notably, over 50% of MF-AGG and ULT-AGG filers are based outside the U.S., likely due to differing disclosure requirements. However, in Q4 2022, U.S. filers outnumbered non-U.S. filers by a factor of two. For 13F reports, 92% of filers are U.S.-based. Across the full sample, non-U.S. institutions account for approximately 15% of filings (14,000 out of 91,000 forms).

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Variable Name	Description	Source
	Panel A. Banks' characteristics	
Stock return Mar 8-13	Stock returns during the period March 8 to March 13	Bloomberg
Information about Banks Assets		
Ln Total Assets	The natural logarithmic of banks' total assets	SP Capital IQ
Large banks	A dummy variable that identifies banks with more than \$100 billion in assets	
Growth in assets	The growth in assets during the period 2018-2022	
Liquid assets	The ratio of liquid assets (cash Noninterest-bearing balances and currency and coin +cash-Interest-bearing balances + available-for-sale debt securities) to total assets.	SP Capital IQ
Loan concentration	Herfindahl-Hirschman Index (HHI) of the following six loan categories: commercial real estate, residential real estate, construction and industrial, consumer, agriculture, and other.	SP Capital IQ
Real estate loans	Real estate-loans to total assets	SP Capital IQ
U.S. Treasury NHT	All available-for-sale (AFS) and held-to-maturity (HTM) U.S. Treasury Securities not held for trading (NHT). AFS securities are reported at fair value while HTM Securities are reported at amortized cost.	SP Capital IQ
Information about Banks Liabilities		
Deposits to assets	The ratio of deposits to total assets	SP Capital IQ
Uninsured deposits	Domestic deposits with balances of \$250,000 or more, scaled by total domestic deposits.	SP Capital IQ
Core deposits	The sum of transaction deposits, savings deposits, and small (denominations less than \$250,000) time deposits, scaled by total deposits.	SP Capital IQ
Reliance on wholesale funding	The ratio of (total borrowings + brokered deposits) to (total borrowings to total deposits).	SP Capital IQ
Measures of Banks Capital Adequacy		
Equity to Assets	The ratio of total equity capital to total assets	SP Capital IQ
Leverage ratio	Tier 1 capital as a percent of adjusted average assets	SP Capital IQ
Common equity ratio	Tier 1 capital as a percent of risk-adjusted assets.	SP Capital IQ

Appendix 1. Description of bank characteristic and sources of information

Appendix 1 (continuation)

Information about Banks	Performance	
ROE	Return on equity computed as the net income before extraordinary items divided by total equity capital	SP Capital IQ
Market to book	The market to book ratio of equity	SP Capital IQ
Efficiency ratio	The ratio of non-interest expense to the sum of net interest income plus non-interest income.	SP Capital IQ
Net Unrealized G/L	The difference between market value and historical cost of securities, scaled by total equity	
Measures of risk		
Beta	Beta computed using daily returns computed using daily returns in the period $3/1/2022$ to $3/1/2023$.	SP Capital IQ /Bloomberg
ROA STD	The standard deviation in the return on asset of the prior 12 quarters.	SP Capital IQ
Ln Z	The natural logarithm of the return on assets plus equity-to-assets ratio that is scaled by the standard deviation in the return on assets.	SP Capital IQ
Non-performing loans (NPL)	The ratio of total nonperforming loans to equity.	SP Capital IQ
Other Banks Characteris	tics	
Int to not-int income	The ratio of total interest to not-interest income	SP Capital IQ
Regional Banks	A dummy variable that identifies regional banks	SP Capital IQ
Options	A dummy variable that identifies banks that have options on their stock.	SP Capital IQ
Measures of liquidity		
Pct. Bid ask-spread	Computed as the average of the percentage spread (ask price – bid price)/((ask price – bid price)/2) in the 1-year period 3/1/2022 to 3/1/2023	Bloomberg
Bid ask-spread	Computed as the average of the dollar spread (ask price – bid price) in the 1-year period $3/1/2022$ to $3/1/2023$.	Bloomberg
Ln Trading days	The natural log of the number of days that the stock of a particular bank was traded in the 1-year period $3/1/2022$ to $3/1/2023$.	Bloomberg
Trading Volume	The average of the natural logarithmic of dollar trading volume (volume x price) computed in the 1-year period $3/1/2022$ to $3/1/2023$	Bloomberg
Returns to volume	The average of the ratio of the daily returns (in absolute value) to the daily volume in the first quarter of 2022	Bloomberg

Table 1 Summary Statistics

	N	Mean	Median	Min	Max	SD
Stock return Mar8 13 (%)	463	-12.36	-11.38	-93.7	5.56	10.7
Information about Banks Assets						
Total Assets	463	38891.71	2571.74	133.89	3670000	267053.36
Growth in assets (%)	463	66.87	52.96	1.01	230.26	50.79
Liquid assets (%)	463	19.17	17.08	4	44.71	9.95
Loan concentration	463	3654.79	3458.24	2383.94	6532.52	901.87
Real estate loans (%)	463	76.84	80.10	31.92	99.53	15.97
US Treasury NHT	463	1.82	0.48	0	11.93	2.87
Information about Banks Liabilities						
Deposits to assets (%)	463	82.54	83.56	63.08	92.1	6.42
Core deposits (%)	463	92.19	94.64	70.71	99.47	7.42
Uninsured deposits (%)	463	45.57	45.21	20.47	79.65	13.72
Measures of Banks Capital Adequacy						
Equity to Assets (%)	463	9.6	9.38	5.35	16.67	2.39
Information about Banks Performance						
ROE (%)	463	11.97	11.71	1.7	21.73	4.44
Market to book	463	1.22	1.12	.65	2.44	.38
Efficiency ratio	463	55.18	55.37	29.7	86.42	11.8
Net Unrealized G L	463	-13.12	-11.04	-42.26	0	10.46
Measures of risk						
Beta	463	.43	0.43	13	1.32	.34
Stdv of stock returns (%)	463	1.91	1.71	.92	4.46	.73
Stdv of ROA	463	.41	0.31	.1	1.95	.36
Ln Z	463	1.59	1.61	.85	2.12	.28
Non-performing loans (%)	463	4.16	3.19	.09	15.38	3.56
Measures of liquidity						
Bid ask-spread	463	1.39	0.90	.03	5.7	1.45
Trading days	463	211.41	252.00	18	252	63.43
Trading Volume (000)	463	12.88	12.72	8.93	18.99	2.8
Return to volume (%)	463	.18	0.02	0	2.18	.42
Other Banks Characteristics						
Not Int to int income (%)	463	19.68	17.00	0	65.13	14.38
Regional banks (%)	463	.82	1.00	0	1	.38
Options	463	.46	0.00	0	1	.5

This table presents summary statistics for key bank characteristics. Appendix 1 defines the variables and provides data sources.

Table 2 Bank ownership

This table reports summary statistics for institutional investor and insider ownership for the sample prior to March 7. Panel A reports statistics on the number of institutional investors and insiders, as well as their ownership. Panel B reports ownership statistics for different types of institutional investors.

	Panel A.	Institutional	Ownership			
	N	Mean	Median	Min	Max	SD
Number of Institutions	463	195.58	90.00	1	4638	393.51
Ownership by Institutions (%)	463	41.15	39.98	0	99.84	30.25
Number of insiders	463	12.93	13.00	0	42	9.14
Ownership by insiders (%)	463	6.6	3.16	0	63.96	9.66
Panel B. Percentag	ge ownershij	o by differen	t types of instr	uctional inv	estors	
	N	Mean	Median	Min	Max	SD
Invest Advisors	463	28	24.38	0	81.96	23.43
Hedge Fund	463	4.3	2.80	0	32.28	4.73
Banks	463	3.42	1.75	0	19.92	4.07
Brokerage	463	1.28	0.59	0	11.45	1.99
Insurance	463	1.43	0.51	0	12.04	2.04
Private Fund	463	1.31	0.00	0	41.23	3.55
Trust	463	.06	0.00	0	9.35	.67
Pension	463	.34	0.00	0	5.63	.66
Government	463	.25	0.04	0	1.66	.34
Sovereign Wealth Fund	463	.03	0.00	0	1.15	.14
Holding Companies	463	.15	0.00	0	9.92	.72
Family Trust	463	.1	0.00	0	42.9	2
Corporation	463	.08	0.00	0	8.12	.63
Vent Capital	463	.04	0.00	0	8.57	.46
Foundation	463	.04	0.00	0	9.6	.53
Other	463	.03	0.00	0	.87	.06
Endowment	463	.01	0.00	0	.07	.03
Business Develop, Corp.	463	0	0.00	0	0	0

Table 3 Analysis of changes in ownership before the period of distress

This table reports the average percentage changes in ownership across deciles of stock returns. It details changes in insider ownership, total institutional investor ownership (IO), and ownership changes for different types of institutional investors. Ownership changes, calculated using information from reports filed between October 1, 2022, and March 7, 2023, are winsorized at the 2.5th and 97.5th percentiles to mitigate the impact of outliers. The table also reports tests of differences in mean returns between the 1st and 10th IO deciles.

Deciles of stock	Insider	ΙΟ	Investment	Hedge	Banks	Brokerage	Insurance
Tetuliis	8	10.10	auvisors	Tunds	4.0.5	10.06	10.00
1	/./6	-10.49	-11.13	-13.16	-4.85	-10.96	-10.22
2	7.64	-5.72	-5.54	-6.54	0.21	-6.96	-7.88
3	6.03	-5.49	-4.92	-11.73	-0.42	-6.03	-7.41
4	5.68	-5.20	-4.20	-14.93	0.45	-13.16	-6.57
5	9.04	-7.45	-7.08	-14.57	-1.89	-0.90	-9.22
6	7.42	-7.79	-7.44	-19.12	-1.62	-4.45	-9.85
7	4.28	-6.00	-5.01	-18.00	-1.93	-5.94	-4.70
8	4.37	-5.31	-4.23	-13.13	-0.50	-8.34	-7.24
9	6.55	-4.71	-3.31	-15.25	-1.63	-4.80	-7.11
10	7.36	-5.69	-5.82	-13.56	1.32	-6.87	-6.00
Mean	6.34	-6.42	-5.88	-13.87	-1.09	-6.78	-7.67
Difference (1)-(10)	0.40	-4.80***	-5.31***	0.40	-6.17*	-4.09	-4.22*
T-test	1.15	8.63	10.22	0.47	1.59	0.92	1.56

Changes in ownership from reports filed from October 1 2022, to March 7, 2023

Table 4. Stock market returns by deciles of institutional and insider ownership

This table reports statistics of stock market returns in the period March 8-11, across deciles of total institutional investor ownership (IO) and insider ownership. Panel A reports bank stock returns across deciles of institutional investor ownership (IO); Panel (B) reports returns across deciles of total insider ownership; Panel C reports average stock market returns across deciles of total institutional investor ownership by investor type. It also reports tests of differences between the mean returns in the 1st and 10th IO deciles.

Panel A. Stock market returns (%) in the period March 8-11 by deciles of total institutional investor ownership									
IO deciles	Mean IO (%)	Mean stock	SD stock	Median stock	Min stock	Max stock			
		returns	returns	returns	returns	returns			
1	.6	-5.629	6.606	-3.585	-29.155	1.765			
2	4.721	-6.574	5.924	-6.17	-20.509	5.556			
3	11.612	-7.334	5.353	-6.764	-19.094	0			
4	21.988	-9.426	6.889	-9.453	-36.93	2.7			
5	34.268	-11.671	5.442	-12.13	-26.717	-1.041			
6	45.926	-12.765	5.701	-13.069	-22.533	.549			
7	56.988	-12.935	4.890	-13.691	-25.249	-2.461			
8	68.084	-13.559	7.963	-12.728	-50.913	-3.279			
9	77.544	-17.733	10.063	-14.533	-64.024	-7.593			
10	90.728	-26.154	20.587	-17.527	-93.701	-5.712			
Panel B.	Stock market retur	rns (%) in the per	riod March 8-11	across deciles of in	sider ownership				
Insiders. Own. deciles	Mean Insiders.	Mean stock	SD stock	Median stock	Min stock	Max stock			
	Own. (%)	returns	returns	returns	returns	returns			
1	0	-7.171	7.318	-5.386	-36.93	5.556			
2	0	-7.171	7.318	-5.386	-36.93	5.556			
3	.422	-20.463	19.017	-14.317	-93.701	-3.279			
4	1.347	-18.074	10.539	-14.151	-64.024	-6.132			
5	2.462	-12.192	7.464	-10.965	-35.219	.63			
6	4.033	-14.269	9.518	-12.321	-64.74	-3.374			
7	5.737	-14.899	12.910	-13.084	-81.255	0			
8	8.186	-9.032	5.908	-10.23	-20.321	2.7			
9	14.217	-11.025	5.704	-11.023	-22.452	-1.893			
10	29.914	-9.796	5.846	-10.115	-26.414	62			
Panel C. Average	stock market retur	ns (%) in the per	iod March 8-11	across deciles of tot	al ownership by	types of			
		institu	tional investor						
IO deciles	Invest Advisors	Hedge Funds	Banks	Brokerage	Insurance				
1	-5.381	-6.752	-5.99	-6.331	-6.237				
2	-6.953	-6.752	-5.99	-6.331	-6.237				
3	-7.336	-10.518	-8.484	-13.284	-8.675				
4	-9.309	-11.296	-10.04	-12.389	-9.263				
5	-11.028	-12.471	-10.516	-11.678	-13.884				
6	-12.863	-13.886	-14.265	-13.149	-16.074				
7	-13.968	-13.851	-15.881	-19.499	-15.554				
8	-14.892	-17.074	-14.723	-17.86	-20.392				
9	-18.686	-14.374	-17.05	-13.975	-13.954				
10	-23.453	-17.377	-21.798	-14.182	-14.022				
10-1	-18.072***	-10.625***	-15.808***	-7.851***	-7.785***				
(t-test)	(6.09)	(5.51)	(8.45)	(5.31)	(6.58)				

Table 5. Analysis of the association between insider ownership, institutional ownership, and stock returns

This table reports results from OLS regressions using different specifications of Equation (1). The dependent variable is bank stock returns (%) from Wednesday, March 8, to Monday, March 13. The main independent variable is the percentage of institutional ownership. *t*-statistics (in absolute values) are computed using Eicker-Huber-White-sandwich heteroskedastic-robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Appendix 1 provides a detailed description of the independent variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Insider Ownership	0.149	0.216^{*}	0.203	0.239^{*}	0.154	0.207	0.148	0.321**
	(1.19)	(1.73)	(1.64)	(1.86)	(1.21)	(1.65)	(1.17)	(2.45)
Insider Ownership x	-0.003	-0.006	-0.006	-0.006	-0.003	-0.005	-0.003	-0.009**
Insider Ownership	(0.73)	(1.40)	(1.29)	(1.45)	(0.74)	(1.11)	(0.70)	(2.03)
IO		-0.092***						
		(3.90)						
Invest Advisors			-0.121***					-0.137***
			(3.56)					(3.03)
Hedge Funds				-0.395***				-0.320***
				(3.92)				(2.99)
Banks					0.071			0.376
					(0.34)			(1.53)
Brokerage						-0.445*		-0.152
						(1.91)		(0.63)
Insurance							0.132	0.446^{*}
							(0.65)	(1.93)
Ln Total assets	0.775	1.107	1.215^{*}	0.505	0.704	0.746	0.764	0.629
	(1.13)	(1.61)	(1.72)	(0.77)	(1.06)	(1.10)	(1.11)	(0.97)
Large Banks	-8.271	-8.804^{*}	-9.902*	-7.463	-8.276	-7.834	-8.317	-9.496*
	(1.54)	(1.65)	(1.82)	(1.42)	(1.54)	(1.45)	(1.55)	(1.71)
Growth in Assets	-0.026**	-0.028**	-0.029***	-0.025**	-0.025**	-0.025**	-0.026**	-0.028***
	(2.38)	(2.55)	(2.67)	(2.41)	(2.31)	(2.33)	(2.38)	(2.60)
Ln Loan	-5.313***	-5.788***	-5.717***	-5.284***	-5.255***	-5.575***	-5.343***	-5.625***
concentration	(3.02)	(3.29)	(3.27)	(3.03)	(3.04)	(3.15)	(3.03)	(3.33)
US Treasury NHT	0.199	0.137	0.146	0.168	0.202	0.190	0.199	0.127
	(1.45)	(1.01)	(1.08)	(1.28)	(1.46)	(1.38)	(1.45)	(0.97)
Deposits to assets	-0.197	-0.187	-0.203*	-0.169	-0.195	-0.199*	-0.201*	-0.188
	(1.63)	(1.58)	(1.69)	(1.46)	(1.63)	(1.66)	(1.65)	(1.64)
Uninsured deposits	-0.116***	-0.107***	-0.111***	-0.114***	-0.117***	-0.114***	-0.116***	-0.109***
	(3.29)	(3.11)	(3.25)	(3.32)	(3.27)	(3.24)	(3.29)	(3.26)
Reliance on	-0.165	-0.174**	-0.187**	-0.146*	-0.164*	-0.162*	-0.165**	-0.161
wholesale funding	(1.99)	(2.12)	(2.26)	(1.83)	(1.95)	(1.94)	(1.98)	(2.04)
Tier I Capital	0.220	0.183	0.150	0.248	0.219	0.280	0.230	0.212
B 6 F	(0.90)	(0.77)	(0.62)	(1.02)	(0.89)	(1.12)	(0.93)	(0.83)
ROE	0.083	0.048	0.059	0.071	0.084	0.060	0.081	0.033
NI / II / 103	(0.64)	(0.37)	(0.46)	(0.56)	(0.65)	(0.46)	(0.63)	(0.26)
Net Unrealized G L	0.068	0.077^{*}	0.074	0.072°	0.069	0.068	0.067	0.076*
	(1.61)	(1.81)	(1.76)	(1.70)	(1.61)	(1.62)	(1.58)	(1.78)

			Table 5	(continued)				
Beta	-14.041***	-11.994***	-11.566***	-14.175***	-14.207***	-14.045***	-14.134***	-12.549***
	(4.19)	(3.81)	(3.63)	(4.31)	(4.04)	(4.23)	(4.18)	(3.85)
Ln Z	1.927	1.316	1.431	1.221	1.931	1.837	1.956	0.889
	(1.01)	(0.68)	(0.73)	(0.64)	(1.01)	(0.96)	(1.03)	(0.46)
Bid ask-spread	1.257**	0.745	0.865	0.782	1.271**	1.128**	1.292**	0.577
	(2.22)	(1.33)	(1.58)	(1.31)	(2.22)	(2.00)	(2.28)	(0.99)
Options	-0.116	1.171	1.292	0.082	-0.244	-0.303	-0.121	0.880
	(0.10)	(1.05)	(1.13)	(0.07)	(0.21)	(0.27)	(0.11)	(0.76)
Constant	-0.335	0.400	0.506	2.383	0.019	0.043	-0.265	5.055
	(0.03)	(0.03)	(0.04)	(0.18)	(0.00)	(0.00)	(0.02)	(0.39)
Observations	463	463	463	463	463	463	463	463
Adjusted R^2	0.391	0.405	0.403	0.411	0.389	0.394	0.390	0.420

Table 6. Stock returns, institutional ownership above 1%, and ownership by the big-three investment advisors and hedge funds

This table reports the average bank stock returns (%) from Wednesday, March 8, to Monday March 13. Panels A and B compare returns between portfolios of banks with institutional ownership (IO) above and below 1% and 5%, respectively. Panel C compares returns between banks held by the big-three investment advisors (BlackRock, Vanguard, and State Street) and smaller investment advisors. Panel D contrasts the returns of the portfolio of banks for the big-three hedge funds (Millennium Management, Citadel and Renaissance Technologies) and smaller hedge funds. *t*-statistics of difference in means are reported in parentheses, in absolute values. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Combined IO less/more than 1%							
<1% Own	-18.75						
>= 1% Own	-16.56						
Diff	2.19***						
(t-value)	(t=8.93)						
Panel B. Combined I	O less/more than 1%						
< 5% Own	-18.67						
>= 5% Own	-15.53						
Diff	3.16***						
(t-value)	(t=6.14)						
Panel C. Combined ownership by t	he "big-three" investment advisors						
Big $3 = 0$	-18.29						
Big $3 = 1$	-15.26						
Diff	3.02***						
(t-value)	(6.44)						
Panel D. Combined ownership	by the "big-three" hedge funds						
Big $3 = 0$	-19.40						
Big 3 = 1	-16.07						
Diff	3.27***						
(t-value)	(5.04)						

Table 7. Institutional investors' specialization and stock returns

This table reports results from OLS regressions of Equation (1) incorporating measures of institutional specialization for the aggregate sample and different types of institutional investor. The dependent variable is bank stock returns (%) from Wednesday, March 8, to Monday, March 13. Panel A measures institutional investors' specialization in the banking sector by the number of banks held in their portfolios; Panel B measures specialization by the total percentage of their portfolios invested in banks calculated as the natural logarithm of the sum of percentage ownership. All specifications include the control variables in Equation (1), not reported for conciseness. Appendix 1 provides a detailed description of these variables. *t*-statistics (absolute values) are computed using Eicker-Huber-White-sandwich heteroskedastic-robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. The natural logarithmic of the number of banks in the portfolio of institutional investors									
	Total IO	Invest advisors	Hedge	Banks	Brokerage	Insurance			
			Funds		-				
IO	-0.346***	-0.319***	-1.141***	0.038	-0.622*	0.757^{*}			
	(3.08)	(2.74)	(3.01)	(0.18)	(1.67)	(1.72)			
N ⁰ of banks with	0.308***	0.246**	0.675**	0.287^{*}	0.703***	0.219			
ownership	(3.06)	(2.57)	(2.57)	(1.95)	(2.86)	(1.23)			
Controls	1.644	-1.104	-4.426	-5.845**	-11.760***	-14.318***			
	(0.69)	(0.46)	(1.65)	(2.16)	(3.43)	(3.96)			
Observations	78413	48437	5903	8767	2332	7106			
Adjusted R ²	0.544	0.551	0.522	0.516	0.523	0.583			

	Total IO	Invest advisors	Hedge Funds	Banks	Brokerage	Insurance
IO	-0.437***	-0.342***	-1.555***	0.227	-1.045**	1.020^{*}
	(3.24)	(2.85)	(3.19)	(0.63)	(2.25)	(1.89)
N ⁰ of banks with	0.125*	0.085	0.374**	0.003	0.335***	-0.056
ownership	(1.81)	(1.32)	(2.32)	(0.03)	(2.96)	(0.43)
Controls	1.644	-1.104	-4.426	-5.845**	-11.760***	-14.318***
	(0.69)	(0.46)	(1.65)	(2.16)	(3.43)	(3.96)
Observations	78413	48437	5903	8767	2332	7106
Adjusted R^2	0.544	0.551	0.521	0.515	0.523	0.583

Table 8 Analysis of the interaction between insider ownership and institutional ownership.

This table reports results from OLS regressions of Equation (1) incorporating the interaction of insider and institutional ownership. The dependent variable is bank stock returns (%). The main independent variable, *Ownership* is the percentage ownership by insiders in Model (1) and by the different types of institutions, in Models (2)-(7). The variable *Ownership x Insider* is the interaction between *Ownership* and insider ownership. All models include the control variables in Equation (1), not reported for conciseness. Appendix 1 provides a detailed description of these variables. For conciseness, the coefficients of these control variables are not reported. The complete estimation results are available in Table 7 of the online appendix.. *t*-statistics (in absolute values) are computed using Eicker-Huber-White-sandwich heteroskedastic-robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	All Institutional	Investment	Hedge	Banks	Brokerage	Insurance
	investors	advisors	funds			
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	-0.074***	-0.090**	-0.513***	-0.048	-0.419	-0.293
	(3.00)	(2.52)	(3.15)	(0.24)	(1.27)	(1.00)
Ownership x Insider	0.005^{*}	0.006^{*}	0.032**	0.050^{**}	0.022	0.070^{**}
ownership	(1.87)	(1.68)	(2.18)	(2.14)	(0.68)	(2.40)
Bank characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observations	463	463	463	463	463	463
Adjusted R^2	0.426	0.424	0.432	0.420	0.416	0.420

Table 9. The correlation between institutional ownership, risk, and liquidity

Pairwise correlations between institutional ownership (IO) and various measures of bank risk and liquidity, as described in Appendix 1

Variables	Total IO	Investment	Hedge Funds	Banks	Brokerage	Insurance
		advisors				
	(1)	(2)	(3)	(4)	(5)	(6)
Beta	0.668***	0.625***	0.027***	0.500***	0.147***	0.237***
Stdv of stock returns (%)	0.400***	0.333***	0.206***	0.164***	0.157***	0.101***
Stdv of ROA	0.174***	0.151***	0.225***	-0.024***	0.168***	0.071***
Ln Z	-0.164***	-0.125***	-0.221***	-0.012***	-0.178***	-0.097***
Non-performing loans	0.025***	-0.043***	-0.015***	0.245***	0.060***	0.146***
Ln trading days	0.451***	0.490***	-0.022***	0.344***	-0.050***	0.211***
Bid ask-spread	-0.662***	-0.687***	0.115***	-0.590***	-0.002	-0.226***
Trading Volume	0.510***	0.432***	-0.298***	0.755***	0.114***	0.299***
Volume to price	0.574***	0.494***	-0.288***	0.785***	0.145***	0.338***
Return to volume	-0.664***	-0.672***	0.059***	-0.585***	-0.031***	-0.257***

Table 10. The determinants of institutional ownership

This table reports results from OLS regressions of different specifications of Equation (2), where the dependent variable is aggregate institutional ownership (IO) (%) in column 1 and the aggregate for different types of institutional investors in columns 2-7. The independent variables are described in Appendix 1. *t*-statistics (in absolute values) are computed using Eicker-Huber-White-sandwich heteroskedastic-robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Aggregate IO	Investment advisors	Hedge Funds	Banks	Brokerage	Insurance
	(1)	(2)	(3)	(4)	(5)	(6)
Ln Total assets	3.317***	3.471***	-0.793***	1.052***	-0.144	0.082
	(2.79)	(4.09)	(2.91)	(6.52)	(1.18)	(0.86)
Large Banks	-5.476	-13.264***	2.093^{*}	0.109	0.962^{**}	0.373
	(1.33)	(3.94)	(1.87)	(0.17)	(2.31)	(0.92)
Growth in Assets	-0.019	-0.028**	0.002	-0.006***	0.003	0.002
	(1.16)	(2.57)	(0.46)	(3.14)	(1.16)	(1.18)
Ln Loan concentration	-5.230	-3.396	0.068	-0.841	-0.574	0.218
	(1.29)	(1.15)	(0.07)	(1.60)	(1.34)	(0.67)
US Treasury NHT	-0.695***	-0.460***	-0.082	-0.046	-0.020	-0.001
	(2.78)	(2.66)	(1.33)	(1.56)	(0.70)	(0.04)
Deposits to assets	0.174	0.001	0.085^{*}	-0.017	-0.003	0.034^{*}
	(1.01)	(0.01)	(1.85)	(0.83)	(0.11)	(1.90)
Uninsured deposits	0.098	0.043	0.005	0.007	0.005	-0.002
	(1.63)	(1.02)	(0.32)	(0.88)	(0.62)	(0.34)
Reliance on wholesale funding	-0.068	-0.157**	0.056^{**}	-0.024**	0.011	-0.004
	(0.79)	(2.56)	(2.43)	(2.49)	(1.07)	(0.43)
Tier 1 Capital	-0.414	-0.588^{*}	0.066	0.015	0.133**	-0.076
	(0.90)	(1.82)	(0.51)	(0.29)	(2.06)	(1.61)
ROE	-0.444**	-0.239*	-0.039	-0.016	-0.046*	0.015
	(2.33)	(1.82)	(0.76)	(0.66)	(1.67)	(0.76)
Net Unrealized G L	0.094	0.048	0.011	-0.006	0.001	0.008
	(1.33)	(0.97)	(0.56)	(0.60)	(0.18)	(1.11)
Beta	21.308***	19.881***	-0.566	2.359***	-0.090	0.672^{*}
	(5.59)	(7.11)	(0.60)	(4.18)	(0.21)	(1.82)
Ln Z	-5.659**	-3.444*	-1.603**	-0.002	-0.210	-0.174
	(2.09)	(1.87)	(2.20)	(0.01)	(0.59)	(0.61)
Bid ask-spread	-6.272***	-3.702***	-1.405***	-0.165*	-0.379***	-0.287***
	(7.33)	(5.81)	(7.72)	(1.78)	(4.26)	(4.10)
Options	14.309***	11.878^{***}	0.584	1.804^{***}	-0.402	0.052
	(5.56)	(6.48)	(0.85)	(5.76)	(1.47)	(0.16)
Constant	5.820	5.144	7.098	-5.911**	1.825	-0.812
	(0.27)	(0.34)	(1.26)	(2.40)	(0.73)	(0.41)
Observations	463	463	463	463	463	463
Adjusted R^2	0.758	0.801	0.141	0.769	0.078	0.157

Table 11. Change in percentage ownership from reports filed from March 8 to March 31

This table reports ownership changes across deciles of stock returns. These changes are computed from reports filed between March 8 and March 13. The table describes changes in insiders' ownership, aggregate institutional ownership (IO), and ownership by different types of institutional investors. Panel A reports the average percentage change, calculated as the position change relative to the prior position; this measure is winsorized at the 2.5th and 97.5th percentiles to mitigate the impact of outliers. Panel B reports the total net change in the number of shares (the number of shares bought less the number of shares sold).

Panel A: Average percentage change in insiders and institutional investors	positions, computed	as the position	change/prior position)
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Deciles of stock returns	Insiders	Institutional investors	Investment advisors	Hedge funds	Banks	Brokerage	Insurance
1	9.86	-23.33	-24.36	-12.10	-21.86	7.05	-30.83
2	6.00	-7.04	-9.23	-0.74	3.65	32.15	-4.53
3	8.42	-6.68	-7.96	-7.68	-1.38	20.80	-6.11
4	6.54	-5.34	-5.75	-13.58	3.74	15.91	-6.38
5	6.37	-5.25	-6.19	-5.58	1.41	14.08	-3.90
6	7.08	-7.01	-8.67	-7.26	2.62	18.98	-4.81
7	4.78	-5.94	-6.79	-15.17	4.78	15.56	-4.91
8	5.98	-6.62	-6.31	-23.81	0.46	13.98	-7.34
9	4.64	-4.50	-4.04	-17.81	-0.81	9.99	-5.45
10	7.78	-5.83	-7.68	2.43	-0.45	17.97	-7.36
Average	6.43	-7.89	-8.78	-9.97	-0.85	16.45	-8.12

Panel B. Net changes in insiders and institutional investors' positions, computed by the number of shares sold/bought (in millions)

Deciles of stock returns	Insiders	All	Investment	Hedge	Banks	Brokerage	Insurance
		institutional	advisors	funds			
		investors					
1	0.73	-229.44	-164.18	3.77	-49.49	-2.13	-6.30
2	1.51	-28.44	29.18	-34.77	3.98	-4.59	-12.64
3	1.50	-15.92	11.55	-11.87	-11.59	-4.45	1.07
4	0.83	-162.04	-84.20	-33.21	-23.48	-1.64	-2.54
5	1.20	-69.27	-20.35	-22.85	-7.69	-11.76	1.39
6	0.53	-0.60	12.75	-10.81	-3.99	1.32	1.74
7	-1.05	-3.13	7.03	-2.95	-4.14	-0.76	0.05
8	0.88	1.59	24.01	-19.98	-0.83	-0.26	0.23
9	0.44	-32.50	-34.00	-5.25	6.13	1.93	-1.71
10	1.73	34.55	77.60	4.37	-57.54	2.86	8.17
Total change	8.30	-505.20	-140.61	-133.55	-148.64	-19.48	-10.54

Table 12. Analysis of the interaction between stock returns and risk and liquidity

This table reports the results of OLS regressions of different specifications of Equation (1) incorporating interactions between institutional ownership and measures of risk and liquidity. The dependent variable is bank stock returns (%) from Wednesday, March 8, to Monday, March 13. Panels A and B report the estimation with interaction term between IO and beta and the percentage bid-ask-spread, respectively. Panel C includes the interaction between ownership and the presence of traded options on the stock, while Panel D includes the interaction between ownership and Ln Z, a measure of default risk. All specifications include the control variables in Equation (1), not reported for conciseness. Appendix 1 provides a detailed description of these variables. *t*-statistics (in absolute values) are computed using Eicker-Huber-White-sandwich heteroskedastic-robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Panel A. Institutional Ownership and Beta								
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Total IO	Invest advisors	Hedge Funds	Banks	Brokerage	Insurance		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	IO	0.057	0.096	0.265**	1.807^{***}	0.264	0.151		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		(1.52)	(1.62)	(2.51)	(3.33)	(1.10)	(0.46)		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	IO # Beta	-0.290***	-0.345***	-1.637***	-2.577***	-1.725**	0.054		
Beta 1.644 -1.104 -4.426 -5.845^{**} -11.760^{***} -14.318^{***} (0.69) (0.46) (1.65) (2.16) (3.43) (3.96) Observations 463 463 463 463 463 Adjusted R^2 0.464 0.448 0.483 0.441 0.406 0.389 Panel B. Institutional Ownership and Percentage Bid-Ask SpreadIOrotal IOInvest advisorsHedgeBanksBrokerageInsuranceIO -0.125^{***} -0.117^{***} -0.915^{***} -0.007 -0.908^{*} 0.509 IO -0.125^{***} -0.117^{***} -0.915^{***} -0.007 -0.908^{*} 0.509 IO $extremation of the state of$		(3.96)	(3.46)	(4.51)	(3.58)	(2.51)	(0.06)		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Beta	1.644	-1.104	-4.426	-5.845**	-11.760***	-14.318***		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		(0.69)	(0.46)	(1.65)	(2.16)	(3.43)	(3.96)		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Observations	463	463	463	463	463	463		
Panel B. Institutional Ownership and Percentage Bid-Ask Spread Total IO Invest advisors Hedge Funds Banks Brokerage Insurance IO -0.125*** -0.117*** -0.915*** -0.007 -0.908* 0.509 IO -0.125*** 0.005 (6.23) (0.03) (1.93) (1.53) IO # Pctg. Bid Ask 0.036** 0.005 0.429*** 0.409* 0.379* -0.259 (2.05) (0.22) (5.86) (1.66) (1.77) (1.42) Pct Bid-Ask 0.440 0.748 0.309 1.272** 0.881 1.299**	Adjusted R ²	0.464	0.448	0.483	0.441	0.406	0.389		
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$		Panel B. Ir	stitutional Owner	ship and Perce	entage Bid-Ask	Spread			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		Total IO	Invest advisors	Hedge Funds	Banks	Brokerage	Insurance		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	IO	-0.125***	-0.117***	-0.915***	-0.007	-0.908*	0.509		
IO # Pctg. Bid Ask 0.036** 0.005 0.429*** 0.409* 0.379* -0.259 (2.05) (0.22) (5.86) (1.66) (1.77) (1.42) Pct Bid-Ask 0.440 0.748 0.309 1.272** 0.881 1.299**		(4.03)	(3.05)	(6.23)	(0.03)	(1.93)	(1.53)		
(2.05)(0.22)(5.86)(1.66)(1.77)(1.42)Pct Bid-Ask0.4400.7480.3091.272**0.8811.299**	IO # Pctg. Bid Ask	0.036**	0.005	0.429***	0.409*	0.379*	-0.259		
Pct Bid-Ask 0.440 0.748 0.309 1.272** 0.881 1.299**	-	(2.05)	(0.22)	(5.86)	(1.66)	(1.77)	(1.42)		
	Pct Bid-Ask	0.440	0.748	0.309	1.272**	0.881	1.299**		
(0.80) (1.40) (0.55) (2.36) (1.57) (2.36)		(0.80)	(1.40)	(0.55)	(2.36)	(1.57)	(2.36)		
Observations 463 463 463 463 463 463	Observations	463	463	463	463	463	463		
Adjusted R^2 0.4090.4010.4430.3900.3970.391	Adjusted R^2	0.409	0.401	0.443	0.390	0.397	0.391		
Panel C. Institutional Ownership and the presence of Options		Panel C.	Institutional Own	ership and the	presence of Op	ptions			
Total IO Invest advisors Hedge Banks Brokerage Insurance Funds		Total IO	Invest advisors	Hedge Funds	Banks	Brokerage	Insurance		
IO -0.045 -0.092** 0.018 0.526 -0.148 0.058	IO	-0.045	-0.092**	0.018	0.526	-0.148	0.058		
(1.62) (2.18) (0.25) (1.23) (0.70) (0.30)		(1.62)	(2.18)	(0.25)	(1.23)	(0.70)	(0.30)		
IO # Options -0.095** -0.036 -1.028*** -0.502 -0.691 0.334	IO # Options	-0.095**	-0.036	-1.028***	-0.502	-0.691	0.334		
(2.06) (0.64) (5.93) (1.11) (1.10) (0.81)		(2.06)	(0.64)	(5.93)	(1.11)	(1.10)	(0.81)		
Options 5.399** 2.215 6.337*** 0.757 0.701 -0.727	Options	5.399**	2.215	6.337***	0.757	0.701	-0.727		
(2.05) (0.99) (3.87) (0.43) (0.54) (0.54)		(2.05)	(0.99)	(3.87)	(0.43)	(0.54)	(0.54)		
Observations 463 463 463 463 463	Observations	463	463	463	463	463	463		
Adjusted R ² 0.410 0.401 0.451 0.389 0.395 0.390	Adjusted R ²	0.410	0.401	0.451	0.389	0.395	0.390		

		Table	12 (continued)		
	F	anel D. Institution	nal Ownership	and the Ln Z		
	Total IO	Invest advisors	Hedge Funds	Banks	Brokerage	Insurance
IO	-0.209	-0.218	-1.371***	-0.643	-1.161	1.137
	(1.50)	(1.16)	(2.61)	(0.46)	(0.80)	(0.95)
IO # Ln Z	0.076	0.066	0.684**	0.441	0.554	-0.636
	(0.87)	(0.55)	(2.07)	(0.56)	(0.62)	(0.87)
Ln Z	-1.515	-0.246	-1.570	0.550	0.898	2.771
	(0.56)	(0.10)	(0.79)	(0.30)	(0.40)	(1.45)
Observations	463	463	463	463	463	463
Adjusted R^2	0.408	0.402	0.419	0.390	0.393	0.390

Table 13. Analysis of hedge fund ownership and stock returns

This table reports OLS regressions of different specifications of Equation (1) incorporating proxies for the relevance of hedge fund ownership: *Hedge to IO* is the ratio of hedge fund ownership to total IO. *High hedge own*. is an indicator variable that identifies banks in the 10th *Hedge to IO* decile; *More Hedge than Inv. Adv*. is an indicator variable that identifies banks with more ownership by hedge funds than by investment advisors. The main dependent variable is bank stock returns (%) from Wednesday, March 8, to Monday, March 13. Models (2), (4) and (6) include banks assets, liabilities and performance in Appendix 1 (not tabled). The results for the full specification are in Table 8 of the online Appendix. *t*-statistics (in absolute values) are computed using Eicker-Huber-White-sandwich heteroskedastic-robust standard errors. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Hedge to IO	8.902***	11.171***				
	(3.37)	(2.94)				
High hedge own			8.782^{***}	2.660^{*}		
			(8.79)	(1.88)		
More Hedge than Inv. Adv					8.343***	3.562***
					(8.01)	(3.17)
Bank characteristics	No	Yes	No	Yes	No	Yes
Observations	451	451	451	451	451	451
Adjusted R ²	0.010	0.426	0.030	0.421	0.037	0.423