Institutional Ownership and Bank Failure

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Codes 510, 520

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Abstract

This paper studies the relationship between institutional ownership level and stability and bank failure during the 2002-2012 period, employing a logit probability model of bankruptcy. We find three main results. First, institutional ownership proportions, and, in particular, proportions of dedicated institutional investors and quasi-indexers are negatively associated with the probability of bank failure from one quarter to eight quarters before failure occurs. Second, this negative relationship is stronger in the case of banks with smaller size and/or a higher level of organizational complexity, suggesting that institutional investors may be more motivated to collect information and monitor the management in banks with higher information asymmetry. Third, institutional ownership duration is significantly longer for banks acquired by other banks, compared to those filing for Chapter 7 liquidation, where duration is the length of time over which institutional ownership is non-zero and maintained. This result implies that Institutional investors with long-term holdings may intervene in the bank failure process to better protect the interest of the shareholders. Regulators should encourage longer-term institutional ownership of banks to reduce bank failure and the associated costs to the FDIC and the taxpayers.

1. Introduction

The financial crisis of 2007-2009 brought about a second peak in the US bank failure pattern, after the saving and loan crisis of the late 1980s. As shown in Figure 1, from 2002 to 2012, 486 banks failed and the FDIC closure costs reached more than $38 billion.[1] Most of these banks failed during the 2008 – 2012 period, and, especially, 157 banks failed in 2010. Most of the failed banks during this period were small banks with an average assets of about $1.43 billion and the total assets of $695.554 billion.[2] In the past three decades, the number of small community banks and their share of total banking assets have declined substantially.[3] Since small banks provide a major source of financing for local businesses, homebuyers, and farmers, it is important for bank regulators and bank managers to study the factors associated with the failure of the small banks.

Previous studies on bank failure utilize accounting-based variables such as capital ratio, loan composition, and noninterest components of bank income (e.g., income from venture capital and securitization) to predict bank failures (Berger and Bouwman, 2013; Ng and Roychowdhury, 2014; Cole and White, 2012; DeYoung and Tora, 2013). Few studies have investigated the role of ownership structure and other governance issues on this subject. Berger et al. (2016) is an exception. This study shows that the shareholding proportion of non-CEO management is positively associated with larger likelihood of bank failure. The rationale is that since non-CEO managers have more direct influence on the bank's daily operations, higher equity ownership of non-CEO managers motivates them to take greater risk leading to bank failure at the expense of the debtholders and taxpayers.

[1] https://banks.org/bank-failures-cost-the-fdic-deposit-insurance-fund-894-million-in-2015/
[2] https://www.fdic.gov/bank/historical/bank/
[3] Between 2008 and 2012, 450 community banks failed and received little assistance from the government (Wilmarth, 2014). During the same period, the aggregate share of community banks in total banking assets shrank from 36.6% to 10.5%. Small banks (assets under $1 billion) were holding only 7.5% of aggregate bank assets in 2015 (Table 2-3; Saunders and Cornett, 2018).

As of 2012, institutional investors were the largest shareholders of publicly traded firms including listed banks and they held more than 70% of the aggregate market value of all NYSE/AMEX/NASDAQ stocks (Kempf et al., 2016). The role of institutional investors in monitoring the management and mitigating the conflicts between debtholder and shareholders has been documented in many previous studies (Gillian and Starks, 2003; Elyasiani and Jia, 2008; Elyasiani et al., 2010; Jiang et al., 2012). For example, Elyasiani and Jia (2008) find that there is a positive relationship between institutional ownership and bank performance with this relationship being weaker for bank holding companies (BHCs) than for comparable utility and industrial firms, indicating the substitution effect of regulation for market discipline.

The question here is whether in small banks with less regulatory intervention, institutional investors can play a more important role, than other shareholders, in monitoring the management and mitigating the prevailing agency conflicts, thereby lowering the probability of bank failure. We examine 55 failed banks during the 2002-2012 sample period for which we have complete information on institutional ownership and other control variables from one quarter to nine quarters before the failure. We compare these failed banks with 498 surviving banks with complete information during the same sample period.

We obtain several findings. First, compared to surviving banks, institutional ownership of the failed banks, measured by their aggregate shareholding proportion, shareholding proportion of dedicated investors, shareholding proportion of quasi-indexers, declined at a much larger rate from one quarter to nine quarters before the closing date, than the corresponding proportions for the surviving banks. Dedicated investors and quasi-indexers are defined in Bushee (2001) and Bushee and Noe (2000): Quasi-indexers and dedicated investors have long-term and stable ownership. Compared to quasi-indexers, dedicated investors have more concentrated investment in portfolio

firms. Second, the negative relationship between the probability of bank failure and institutional ownership is confirmed by a logit probability model, especially for the shareholding proportion of quasi-indexers. Third, this negative relationship is significantly stronger in the sub-sample of smaller banks and banks with higher level of organizational complexity, indicating that institutional ownership is more effective in banks with higher level of information asymmetry.

Fourth, the logit model of bank failure which decomposes the shareholding proportions into the lagged level and the change in shareholding proportion shows that dedicated and quasi-indexer investors can trade on private information. This inference is made based on the finding that changes in shareholding proportion of dedicated and quasi-indexer investors have negative and significant coefficients indicating that departure of these investors increases failures. This result implies that dedicated institutional investors, and institutional investors with longer duration of ownership are more skilled in protecting the interests of shareholders, perhaps by intervening in the bank failure process. Fifth, conditional on financial distress, the shareholding proportion of dedicated investors is associated with reduced probability of bank failure.

The remainder of this paper is organized as follows. Section 2 reviews the literature and the hypotheses, Section 3 discusses the models, methods and the data, and Section 4 presents the primary empirical results. In Section 5, we study how the organizational complexity and BHC size affect the relationship between bank failure and institutional ownership. In Section 6, we examine demand shocks and informational advantage held by institutional investors as alternative explanatory forces in describing the link between institutional ownership and bank failure. In Section 7, We examine the relationship between bank failure and institutional ownership, conditional on bank financial distress. In Section 8 we show the relationship between bank failure

outcomes and institutional ownership. Section 9 conducts the propensity score matching estimation as a robustness check and Section 10 concludes.

2. Literature Review and Hypotheses

2.1. Bank failure and institutional ownership

This study is associated with two streams of literature: bank failure and institutional ownership. A number of recent studies have examined the association between capital adequacy, loan compositions, nontraditional banking activities and other accounting related variables and bank failure (Berger and Bouwman, 2013; Cole and White, 2012; DeYoung and Tora, 2013; Ng and Roychowdhury, 2014). However, these studies generally overlook the impact of the ownership structure of the bank on bank failure. Berger et al. (2016) is one of a few exceptions. The latter authors find that a higher shareholding proportion of non-CEO management is positively related to the probability of bank failure, indicating the importance of bank management ownership in explaining the likelihood of bank failure. The explanation is that non-CEO managers are more likely to be motivated to take higher risk in order to increase the value of their stocks, than CEOs, given their larger shareholding and their direct influence on the bank's daily operations (Meiselman, et al., 2018).

Berger and Bouwman (2013) include shareholding proportion of institutional block holders (institutional investors with at least 5% shareholding proportion) as a control variable in studying the relationship between capital ratio and bank's performance in terms of surviving probability and market share. Among three bank size groups, only in the medium-size bank group, the coefficient of block ownership is positive and significant for the regression of bank

surviving probability during the banking and market crises. The banking crises considered include the credit crunch of the early 1990s and the subprime lending crisis of 2007 - 2009. The market crises include the stock market crash of 1987, the Russian debt crisis of 1998, the Long-Term Capital Management (LTCM) bailout of 1998, the bursting of the dot.com bubble in 2000-2002, and the September 11 terrorist attacks of 2001.

Institutional investors can influence corporate governance through two channels: voice ("shareholder activism") and exit ("vote with feet"). As summarized in the survey paper by Denes et al. (2017), activism based on significant stockholding is associated with improvement in stock returns, earnings and corporate governance (Brav et al., 2008; Del Guercio et al., 2008; Smith, 1996). In terms of pressure from institutional investors on the investee firms through selling the stocks (voting with their feet), there is abundant evidence based on studies of the effect of the changes in institutional ownership. For example, Barabanov et al. (2008) find that the percentage change in the ownership of institutional investors with high monitoring incentives (investment advisors and mutual funds) is significantly negatively related to the predicted probability of litigation risk, indicating the proactive trading behavior of institutional investors. This type of influence from institutional investors on investee firms is made possible by their expertise in processing public information (Hendershott et al., 2015) and collecting private information from lending relationship or the process of large and concentrated holding (Ivashina and Sun, 2011; Bushee and Goodman, 2007).

Institutional investors with long and stable holding are more likely to engage in monitoring management and improve firm performance. Elyasiani and Jia (2008) find that institutional ownership stability, measured by non-zero-points and maintain-stake-points durations, are positively related to bank performance (ROA, Tobin's Q and EBIT to total assets ratio) after

addressing the endogeneity issue of institutional ownership with instrumental variables. This indicates that stable and long-term institutional ownership exerts a positive influence on bank performance.

Boehmer and Kelley (2009) find that increased institutional ownership improves the informational efficiency of prices measured by the deviations from a random walk after controlling the liquidity improvements. The rationale is that greater competition among informed institutional traders induces faster incorporation of private information and higher informational efficiency of prices. The evidence of institutional ownership effect in reducing information asymmetry is also found in institutional monitoring effect on financial misreporting and earning management. Burns et al. (2010) have reported that concentrated institutional investors are greater monitors and more effective in reducing the probability of financial restatement. Elyasiani et al. (2017) find that monitoring institutions (institutions with large and long-term stakes and independent from managers) is associated with less earnings management, especially for larger and riskier banks. Cremers and Pareek (2016) report that patient and active mutual fund managers who hold stocks stably (managers with longer-term ownership or lower turnover) outperform others in terms of abnormal stock return, suggesting that those long-term institutional investors have outstanding managerial skills in picking good-quality stocks.

The studies about the relationship between institutional ownership and bankruptcy are fewer. An example of such studies is Erenburg et al. (2015). These authors find that for chronic underperformers, increases in institutional holdings are negatively associated with the probability of failure and positively related to the probability of acquisition. However, this study excludes financial firms and only uses aggregated institutional ownership measures which cannot distinguish the monitoring incentive of different institutional investors. To our knowledge, there

is no study on the relationship between institutional ownership and bank failure. Considering the above argument and empirical evidence, we propose the following hypothesis (H_1):

H1: Institutional ownership is negatively related to the probability of bank failure.

Bank assets are found to be more opaque for outsiders to evaluate than those in other industries, especially during the financial crisis (Flannery et al., 2013; Jones et al., 2012; Elyasiani and Wang, 2008). Consistent with this, bond rating agencies disagree more over banking assets such as loans, than over other types of firms (Morgan, 2002). Moreover, opaque banks are found to have benefited the most from intra-industry revaluations associated with announcements of mergers of other banks before the crisis, but suffered the largest price decline during the crisis, indicating that bank asset opacity can contribute to systemic risk (Jones et al., 2012).

Elyasiani et al. (2010) find that institutional ownership stability (as defined in the third paragraph of Section 2.1.) and shareholding proportion is negatively related to cost of debt. Furthermore, this negative relationship is stronger in firms with more severe information asymmetry (lower analyst coverage and higher residual volatility in daily stock returns), greater agency costs of debt (higher level of long-term debt), and greater agency cost of equity (lower industry insider ownership). These findings suggest that institutional ownership plays a more important role in firms with higher information asymmetry and agency conflicts.

The evidence on the relationship between bank size and information asymmetry is mixed. Banks of different sizes have different business models and varied magnitudes of information asymmetry. Small banks typically follow the traditional "originate-to-hold" lending model in the sense that they keep the loans they make on their balance sheets and control their credit risk by intensive monitoring of their borrowing and maintaining long-term lending relationships with their

customers. Contrary to this, large banks follow a model of "originate-to-securitize" that transfers credit risk to investors in the marketplace by originating and securitizing loans (DeYoung et al., 2004). Large bank size is also associated with greater complexity of organization (Elyasiani and Jia, 2018). Bai and Elyasiani(2013) show insignificant size effect based on both stdROA and Z-Score. Avramidis et al. (2018) show that the relationship between bank size and market to book value of assets is inverse U-shaped, indicating that the increasing monitoring costs associated with large bank size (monitor borrowers and managers) offset the benefits from economies of scale in large banks. By examining an international sample of banks over the 1991-2011 period, Bertay et al. (2013) find that interest expenses, as a proxy of market discipline by depositors, decline more with equity for the sample of larger banks, indicating stronger market discipline effect for banks with larger size. Therefore, it is possible that large banks have a higher level of information asymmetry and institutional investors play a greater role in collecting information and monitoring the management, than for the small banks.

Alternatively, institutional investors may play a more important monitoring role in smaller banks for several reasons. First, smaller banks are more likely to be monitored by institutional investors since the largest banks can be regarded as "too-big-to fail" or "near too-big-to fail", necessitating less market discipline by depositors and shareholders. Large banks are under close supervision of regulators including the Federal Reserve System and also under greater scrutiny by analysts. As a result, this higher level of regulation, disclosure requirement, and greater scrutiny by analysts may partially replace the market discipline exerted by institutional investors. In this scenario, institutional investors may be less informative and less effective in monitoring the investee firms than other investors.

The supportive evidence is that Flannery and Sorescu (1996) find spreads on subordinated debentures declined with bank asset size, namely that subordinated debt holders required a smaller premium in large banks because they perceived the riskiness to be smaller. Flannery et al. (2013) show that bank opaqueness, proxied by higher bid-ask spread, was significantly greater for smaller BHCs traded on NASD, relative to matched nonfinancial firms, while large BHCs traded on NYSE seemed no more opaque than their matched nonfinancial firms. The substitutive relationship between regulation and monitoring of institutional ownership is also documented by Elyasiani and Jia (2008). These authors find that the positive relationship between profitability (return on assets, ROA) and institutional ownership stability (as defined in Section 2.1) is weaker in regulated utility and financial industries, indicating the substitution of regulation for owner monitoring in banking. Second, institutional investors may have better skills in monitoring or picking smaller stocks. Lewellen (2011) shows that institutional holdings of the smallest stock quintile beat a value-weighted index of the stocks by 0.66% quarterly, and the alphas for CAPM and Carhart four-factor are both statistically significant, while there is no evidence that institutional investors have superior stock-picking skills in large stock quintiles.

Complex organizational structure in the banking industry is associated with greater difficulty in processing soft information, resulting in higher information asymmetry (Stein, 2002; Berger et al., 2005; Elyasiani and Yong, 2009). Crimmel and Elyasiani (2017) have found that banking concentration associated with complex organizational structure is related to greater market volatility in the US. Stocks, options, and corporate bond markets. Carson et al (2018) shows that number of business segments, a proxy for organizational complexity and opacity, is positively and significantly related to stock crash risk. Along the same lines, Elyasiani and Jia (2019) find that

organizational complexity help explain the large performance decline and systemic risk increase of large banks during the financial crisis period.

Considering the monitoring expertise of institutional investors, we expect they will play a more efficient role in monitoring BHCs with higher organizational complexity. However, it is also possible that the organizational complexity may make it difficult for institutional investors to monitor since they are not insiders. Schmidt and Fahlenbrach (2017) propose high-cost monitoring hypothesis that some governance activities such as mergers and acquisitions are much most costly to monitor for passive institutions, such as indexers which constitute the majority of the institutional investors, and the effect of institutional monitoring is negative or insignificant.

Since most of our sample banks' institutional ownership information is from their head office BHCs, it is possible that the organizational complexity of the BHCs affects this relationship. Thus, we propose the following hypothesis*:*

H_2: The negative relationship between bank failure and institutional ownership will be stronger in small banks and banks with higher level of organizational complexity.

The outcomes of bank failure include filing for chapter 7 liquidation and acquisition by another bank. In chapter 7 liquidation cases, shareholders are more likely to lose all investments than in cases of acquisition by another bank. Jiang et al. (2012) find that the presence of hedge funds in the equity committee of Chapter 11 is associated with higher likelihood of emergence from the bankruptcy process and more favorable returns to existing shareholders, indicating the stock-picking ability of hedge funds and a positive role played by hedge funds in mitigating the interest conflict between shareholder and debtholder. Ivashina et al. (2016) also find that higher debt ownership concentration is related to better Chapter 11 restructurings. As long-term shareholders, stable institutional investors may mitigate their conflict of interest with debt holders,

cooperate with one another in monitoring management, and reach a better outcome for shareholders. Thus, we propose the following hypothesis:

H_3. Higher (lower) institutional ownership proportion and stability is associated with the higher probability of acquisition (higher probability of chapter 7 liquidation) as the bankruptcy outcome.

3. Model, variables and data

3.1. Bank failure probability model

Following DeYoung and Torna (2013) and Cole and White (2012), we use the following logit model to test our hypotheses.

$$\text{Prob (fail = 1)} = F(B0 + B1\ \text{IO variables}_{t-1-t-9} + B2\ \text{bank specific variables}_{t-1-t-9} + B3\text{Macro variables}_{t-1-t-9}) \quad (1)$$

In the above model, $F(z) = e^z/(1 + e^z)$ is the cumulative logistic distribution. Fail is equal to one if a bank fails in a specific quarter, otherwise it is zero. Probability of bank failure is a function of institutional ownership variables as described below, bank specific variables, and macro-economic variables in one quarter to nine quarters before the bank failure (quarter of closing-date). B1, B2 and B3 are the vectors of parameter estimates for the explanatory variables. We estimate the above bank failure model with standard binomial logit estimation techniques and we cluster the standard errors at the bank level (DeYoung and Torna, 2013).

3.2. Variable Definitions

3.2.1. Institutional ownership variables

Aggregate institutional ownership proportion (prop) is calculated as the sum of shareholding proportions of all institutions. Shareholding proportion of the largest 5 institutional

investors (prop5) is the sum of the shareholding proportions of the 5 largest institutional investors of a bank in a specific quarter. We also use the total number of the institutional investors (# investors) as another measure of aggregate institutional ownership as in Cornett et al. (2007) and Elyasiani and Jia (2008). We follow Bohren et al. (2005) to construct the *non-zero-points duration* and *maintain-stake-points duration*. Non-zero-points duration is the number of quarters in which an institutional investor has non-zero holdings out of the 20 quarters over the five-year period including the current and the previous four years. Maintain-stake-points duration is the number of quarters in which an institutional investor maintains its stake (either keeps the same proportion or increases the holding) out of the 20 quarters. Thus, the higher the non-zero-points or the maintain-stake-points duration, the higher the ownership stability will be. We calculate the average of each of these two measures across all institutional investors in a firm and use them as duration measures for the firm.

Following Bushee (2001) and Bushee and Noe (2002), we also calculate the shareholding proportion of dedicated investors, quasi-indexer and transient investors using the classification provided by the website of Bushee. [4] Dedicated investors have low turnover and more concentrated holdings, quasi-indexer institutions have low turnover and diversified portfolios, and transient investors have high portfolio turnover and diversified portfolios.

3.2.2. Bank-specific control variables

DeYoung and Torna (2013) find that the probability of distressed bank failure (defined as the bank failure probability conditional on bank distress) decreases with the level of fee-based nontraditional activities (securities brokerage and insurance sales) but increases with stakeholder

[4] http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

nontraditional activities (venture capital and securitization). Following DeYoung and Torna (2013), we construct five variables related to income and profit of a bank. Return on assets (ROA) is net income divided by total assets. Net interest income ratio is net interest income (interest income minus interest expenses) divided by total assets. Noninterest income is decomposed into nontraditional stakeholder activities, fee-for-service activities, and traditional fee activities. Nontraditional activities income ratio is the sum of income from venture capital, insurance underwriting and trading activities, securitization and investment banking scaled by total assets. Fee-for-service activities income ratio is the sum of income from servicing, brokerage and insurance sales scaled by total assets. Traditional fee activities is the residual noninterest income after we deduct the above two components from noninterest income and then scale it by total assets.

Bank liquidity risk is related to bank failure and performance. We measure liquidity risk with brokered deposits and core deposits and scale these two variables with total assets. In addition, bank performance and risk are highly related to its operating efficiency. Thus, we include the efficiency ratio, defined as the total noninterest expense scaled by the sum of net interest income and noninterest income, among the control variables. We use the nonperforming loan ratio as a proxy for credit risk (Cole and White, 2012). Cole and White (2012) find that bank loan composition was an important factor in explaining bank failures during 2009. Specially, construction and development loans, commercial mortgages, and multi-family mortgages were positively related to bank failure.

Following Cole and White (2012), we construct six variables scaled by total assets related to bank loan composition: (1) Real estate residential single-family (RER14), and (2) Real estate multifamily mortgages (remul) are safe mortgage loans and they are expected to be negatively associated with bank failure. (3) Real estate construction and development loans (recon) are short-

term risky loans to real estate developers. (4) Real estate nonfarm nonresidential mortgages are the loans whose repayment relies on rental income associated with the property, including loans secured by hotels, motels, dormitories, nursing homes, assisted-living facilities, mini-storage warehouse facilities, etc.[5] (5) Commercial and industrial loans (CI) are loans to businesses. Banks have traditionally developed expertise to control risk and the proportion of CI loans relative to total assets is expected to be negatively related to bank failure. (6) Consumer loans (CONS) include mainly car loans and credit card loans.

Following Cole and White (2012), we construct a loan loss reserve indicator as a ratio of loan loss reserves to total assets. Loan loss reserves provide a source to cover future loan losses and they are supposed to reduce bank failure. However, Ng and Roychowdhury (2010) find that loan loss reserves used to increase capital adequacy (add-backs) are positively associated with bank failure, implying that weak banks or distressed banks, which rely on add-backs to increase regulatory capital, are more likely to fail. Following DeYoung and Torna (2013) and Cole and White (2012), we also include securities investments and goodwill as control variables.

3.2.3. Macro-economic variables

Following DeYoung and Torna (2013), three state-level macro-economic indicators (unemployment rate (ue), growth in state-level housing prices (pct_chng) and growth in state-level personal income (pig_growth)) are also included as control variables. The expectation is that banks in states with higher unemployment rate, lower growth in housing prices and personal income are more likely to fail. The definitions of all the variables are listed in Table 1.

3.3. Sample and Data

[5] Nonfarm-Nonresidential Loans Take Down Kansas Bank: https://seekingalpha.com/instablog/388783-christopher-menkin/206031-nonfarm-nonresidential-loans-take-down-kansas-bank

FDIC's failed bank list provides the names of failed banks, their FDIC identifiers (RSSD9050) and the closing dates. According to this data source, 435 banks failed between 2002 and 2011. However, most of these banks were private banks without institutional ownership information. When we match the failed bank list with the call report database, and the 13f database on institutional ownership, we only get complete information for two failed banks.[6,7] Therefore, we retrieve the failed banks' head office data, namely the BHC information, from the BHC database. The rationale is that there are more failed banks with parent companies as publicly traded BHCs than failed banks which themselves are public banks with institutional ownership data. To be specific, we link the failed banks to the institutional ownership information of their parent BHCs. As shown in the first column of Appendix 2, there are two stand-alone failed banks (Cape Fear Bank and City Bank) (type = bank) with the rest being failed banks affiliated with BHCs (type = head). Since the former sample is too small, we focus on the latter sample with institutional ownership data.

To link the failed banks to institutional ownership of affiliated BHCs, we first match head office identifiers of the failed banks in the call reports [8] to a dataset linking Federal Reserve Bank regulatory identification numbers (RSSD ID) to the permanent company identification numbers (PERMCO) of the Center for Research in Security Prices (CRSP).[9,10] Second, we match the call report dataset constructed from the first step with the institutional ownership data from Thomson

[6] https://www.fdic.gov/bank/individual/failed/banklist.html
[7] City Bank (FDIC CERT=21521) closed on April 16, 2010 and Cape Fear Bank (FDIC CERT=34639) closed on April 10, 2009.
[8] https://www.chicagofed.org/banking/financial-institution-reports/commercial-bank-data
[9] https://www.newyorkfed.org/research/banking_research/datasets.html
[10] The variable of current head office ID_RSSD is RSSD9348 in call reports.

Financial 13f database with the identifier PERMCO. We end up with 53 failed banks affiliated with publicly listed BHCs for which institutional ownership information is available.

Using the above matching method, we also obtain the full sample of commercial banks with institutional ownership data either for the commercial bank itself or its head office of the BHC which is publicly listed.[11] Following DeYoung and Torna (2013), we collect quarterly state-level macro-economic variables including growth rate in personal income, unemployment rate, and growth in housing prices, from Websites of Bureau of Economic Analysis, Federal Reserve Bank at St Louis, and Federal Housing Finance Agency. [12]

After deleting bank-quarter observations with missing variables and aggregated institutional ownership proportion over 100%, we have 18,841 bank-quarter observations from 498 surviving banks and 1115 bank-quarter observations from 55 failed banks during the sample period 2000 - 2011(see Appendix 2). The sample statistics and variable definitions are presented in Table 1. We list the mean and the standard deviation of all variables for all banks, surviving banks and failed banks. The differences and the t-statistics of primary variables for surviving banks and failed banks are listed in the last column of Table 1. Generally, surviving banks have significantly higher institutional ownership shareholding proportions (aggregate (row1), largest 5 investors (row2), and dedicated investors (row 3) and quasi-indexers (row 4)) and longer institutional ownership duration (non-zero points (row 6) and maintain-stake duration (row 7)).

[11] 30 public banks and 468 banks with head office as publicly traded BHCs are matched.
[12] Data sources: personal income is from Bureau of Economic Analysis website (https://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5#reqid=70&step=30&isuri=1&7022=36&7023=0&7033=1&7024=nonindustry&7025=0&7026=xx&7027=2011,2010,2009,2008,2007,2006,2005,2004,2003,2002,2001,2000&7001=336&7028=1&7031=0&7040=-1&7083=percentchange&7029=36&7090=70), state level unemployment rate(https://research.stlouisfed.org/pdl/337), and housing price index (https://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx#qat)

Surviving banks are also significantly more profitable in terms of return on assets (ROA in row 8), net interest income ratio (row 9) and three measures of noninterest income (stakeholder (row (10), fee-for-service (row 11), and traditional fee income (row 12)). Furthermore, surviving banks have significantly lower liquidity risk than failed banks (lower brokered deposits (row 13) and higher core deposits (row 14)). Bank failure during the sample period is strongly associated with their loan composition, especially commercial real estate loans (Cole and White, 2012). Our results are similar to Cole and White (2012) and DeYoung and Torna (2013): surviving banks have significantly higher safe residential single-family mortgages (RER14 in row 15), lower multifamily mortgages (remul in 16), lower construction & development loans (recon in row 17), and lower real estate nonfarm nonresidential mortgages (recom in row 18). Surviving banks also have higher commercial and industrial loans (CI in row 19) and consumer loans (cons in row 20). Consistent with the result of Ng and Roychowdhury (2010) that bank failures in 2008 and 2009 are positively related to loan loss reserves added back as regulatory capital in 2007, surviving banks have significantly lower loan losses reserves (LLR in row 21) than failed banks. In addition, surviving banks have significantly higher levels of securities investments (SEC in row 22) and goodwill (goodwill in row 23). As expected, surviving banks also have significantly lower levels of nonperforming loans (nonperforming in row 24) and lower expense ratios proxied by the efficiency ratio (effic in row 25), indicating lower credit risk and higher efficiency. In terms of macro variables, we find that states with more surviving banks have significantly lower unemployment rate (ue in row 26), higher housing prices growth (pct_chng in row 27,) and higher personal income growth (pigrowth in row 28).

4. Primary Empirical Results

4.1. Comparison of institutional ownership characteristics of surviving and failed banks

Figures 2 and 3 plot the institutional ownership proportions and duration measures over the 20 quarters before the closing dates, respectively. According to Figure 2, aggregated institutional ownership proportion (prop) declined from 25.7% from the 20 quarters before the failure, to 13.2% in one quarter before the failure. Similarly, the shareholding proportion of the 5 largest institutional investors (prop5) dropped from 15.35% to 8.37% during the same sample period. Along the same lines, the shareholding proportions of dedicated investors declined (from 3.32% to 0.3%), for quasi-indexers (from 15.77% to 9.91%), and for transient investors (from 66.34% to 3.03%). Figure 3 depicts a similar trend of decline for institutional ownership duration measures: Non-zero points (maintain-stake) duration is 19.41 (18.01%) in 20 quarters before the failure and 10.01 (8.37) one quarter before the failure.

In Table 2, we conduct the t-tests of equality of these institutional ownership variables between surviving banks and failed banks from one quarter to nine quarters before the failure. In each institutional ownership measure panel, the first and second rows are the mean values of surviving banks and failed banks, respectively. The third and fourth rows show the differences and t-values, respectively. According to this table, surviving banks have higher institutional ownership shareholding proportions and longer durations than failed banks, though the differences decline from one quarter (quarter-1) to 9 quarters before the closing date (quarter-9). Most of the differences are statistically significant, except for the shareholding proportion of 5 largest investors in the last five columns (from quarter-5 to quarter-9), maintain-stake-points duration in 6 and 7 quarters before the closing date, and shareholding proportion of transient investors from 5 quarters to 8 quarters before the closing date.

4.2. Bank failure probability model estimation

The estimation results of the logit model of bank failure probability (Eq 1) are reported in Table 3. Panel A, B, and C in this table show the results based on lagged information from one to three quarters, four to six quarters, and seven to nine quarters ahead of the closing date, respectively. Three columns in each set of estimation display the results with three sets of institutional ownership measures: aggregated shareholding proportion (prop), shareholding proportion of 5 largest investors (prop5), and shareholding proportions of dedicated investors (prop_ded), quasi-indexers (prop_qix), and transient investors (prop_tra), respectively.

In Table 3, columns (1, 4, 7) of Panel A and B, and columns (1, 4) of Panel C show that aggregated shareholding proportion (prop) is significantly negatively related to the probability of bank failure from one to eight quarters ahead of the closing date. In nine quarters before the bank failure (column 7 of Panel C), the coefficient of aggregated shareholding proportion (prop) turns insignificant, though it is still negative. Economically, one standard deviation increase in aggregate shareholding proportion in one quarter before the failure will reduce the probability of failure by 90.7% (1-exp(-0.107*22.207)=0.907, with coefficient of prop -0.107 and standard deviation of 22.207). Even in eight quarters before the failure, the failure probability will diminish by 45.1% (1-exp(-0.027*22.207=0.451), given the change of the same magnitude. This result supports Hypothesis H_1 purporting that institutional ownership is negatively related to the probability of bank failure. The coefficients of shareholding proportion of 5 largest institutional investors (prop5) are negative and significant across seven quarters before the closing date (columns 2, 5, and 8 of Panel A and B and column 2 of Panel C) and it turns to insignificant in eight and nine quarters before the failure (columns 5 and 8 of Panel C). In terms of economic significance, given the increase of one standard deviation of the shareholding proportion of the 5 largest institutional

investors (8.142%), the bank failure probability will decrease by 90.8% (1-exp(-0.293*8.142)), with coefficient of prop5 as -0.293) in one quarter before the failure, by 68.8% in four quarters before the failure (1-exp(-0.147*8.142)), and 39.6% (1-exp(-0.062*8.142)) in seven quarters before the failure.

Shareholding proportions of dedicated investors, quasi-indexers, and transient investors show more varieties in terms of signs and significance. The shareholding proportion of dedicated investors (prop_ded) is negatively related to bank failure probability in the estimation of one, six, seven, and eight quarters ahead, and the associated decline of bank failure probabilities are 89.6% (1-exp(-0.365*6.210)), 54.6%, 60.8% and 69.3%, respectively. Apparently, dedicated investors were trying to influence the management and reduce the failure probability during these periods. The coefficients are negative and insignificant for two, three, four, five and nine quarters ahead. The shareholding proportion of quasi-indexers (prop_qix) is significantly negatively related to bank failure probability across all nine quarters before the closing date, implying that quasi-indexers are at least the most informed investors, if not the most effective monitors. This result supports Appel et al. (2016) suggesting that indexers exert a positive influence on corporate governance. The sign of the coefficient of shareholding proportion of transient investors (prop_tra) turns from negative and significant in two quarters ahead to positive and significant in eight and nine quarters ahead. The unexpected trading behavior may indicate that trading strategies or investment criteria of transient investors are not related to bank failure probability and they do not engage in monitoring of bank management.

5. Factors determining the intensity of the bank failure-IO relationship

5.1. Is the relationship between bank failure probability and IO variables associated with the complexity of the BHC organization?

Since most of the failed banks are related to institutional ownership through their head office BHCs, we are curious whether the complexity of the head office BHC of the failed bank affects the ability of institutional investors to collect information and monitor the bank management. We employ several measures of organization complexity to investigate this issue: (i) number of bank subsidiaries, (ii) number of foreign nonbank subsidiaries, (iii) number of nonbank subsidiaries (Berger and Bouwman, 2013), (iv) the ratio of net income of a bank to that of its head office BHC, and (v) the ratio of total assets of a bank to that of its head office BHC. We create dummy variables to indicate the higher level of organizational complexity in terms of the above measures and interact institutional ownership variables with the organizational complexity dummies. However, most of the interaction terms are not significant, expect for those from the ratio of net income of a bank to that of its head office BHC. The estimation results are presented in Table 4.

In Table 4, in the baseline bank failure probability model, we add a dummy variable indicating a lower ratio of bank net income to that of its head office BHC (LOW income share dummy), as well as its interaction term with the institutional ownership variable (prop*LOW income share dummy or prop 5* LOW income share dummy). To save space, we only report the results based on information from lagged one quarter (columns 1 and 2), lagged four quarters (columns 3 and 4), and lagged seven quarters (columns 5 and 6). The results for shareholding proportion (prop) and those for shareholding proportion of 5 largest investors (prop5) are in columns (1, 3, 5) and columns (2, 4, 6), respectively. The coefficient of the interaction term between aggregate shareholding proportion and the dummy for lower ratio of bank net income to that of its head office BHC (prop*LOW income share dummy) is negative and significant in columns (1, 3). Economically, one and four quarters before the bank failure, in the banks with higher organizational complexity (lower ratio of bank net income to that of its head office BHC),

institutional ownership is associated with the reduced bank failure probability by 19.3% and 14.1% (1-exp(-0.215) and 1-exp(-0.152), the coefficient of prop*LOW income share dummy in columns (1) and (3) of Table 4) than banks with lower organizational complexity. The coefficient of the interaction term between shareholding proportion of the largest 5 investors and the dummy for lower ratio of bank net income to that of its head office BHC (prop 5*LOW income share dummy) is also negative in columns (2, 4, 6), though it is only significant in column (2). The significant negative coefficients for one quarter and four quarters ahead of bank failure indicate that in banks with higher organizational complexity (lower ratio of bank net income to that of its head office BHC), the negative relationship between bank failure probability and lagged shareholding proportion of its head office BHC has larger magnitude. The implication is that the institutional investors' ability to either collect information or monitor bank management is better in banks with higher level of organizational complexity.

5.2. Is the relationship between bank failure probability and institutional ownership associated with bank size?

Following the same method in last section, we create a size dummy indicating smaller bank size below the median value in a specific quarter (Small size dummy).[13] We add this dummy and its interaction term with institutional ownership variables (prop*Small size dummy and prop 5*Small size dummy) to the bank failure probability model. Results are reported in Table 5.

Similar to the last section on bank organization complexity, the coefficients of the interaction terms (Prop*Small size dummy and Prop5*Small size dummy) are negative and significant in

[13] We also tried to use total assets of $1 billion as a different threshold to define small banks. The results are qualitatively the same: The interaction term between shareholding proportion and small size dummy (prop*small size dummy) is negative and significant in four quarters ahead failure window. The interaction terms between shareholding proportion of 5 largest investors and small size dummy is negative and significant in one quarter ahead and four quarters ahead failure window.

columns 2, 3, and 4 of Table 5, while all of the coefficients are also negative. Economically, in one quarter before the bank failure, in the small banks, institutional ownership of 5 largest investors is associated with the reduced bank failure probability of 23.6% (1-exp(-0.269), -0.269 is the coefficient of prop*Small size dummy in columns (2) of Table 5) than in large banks. Similarly in four quarter before the bank failure, institutional ownership of 5 largest investors in small banks can reduce bank failure probability by 14.6% (1-exp(-0.158), -0.158 is the coefficient of column (4) of Table 5) than in large banks. This result indicates that institutional investors' ability in collecting information and monitoring bank management is more pronounced in banks with smaller size. It is also possible that the lower level of regulator intervention in small banks motivates institutional investors to invest in smaller banks and to play their roles more effectively.

6. Demand shock versus informational advantage

Gompers and Metrick (2001) argue that the positive relationship between institutional ownership and future return is the result of two forces: trading on private information and persistent demand shocks as detailed next. They decompose the current quarter institutional ownership (IO_t) into the last period's institutional ownership level (IO_{t-1}) and the change in institutional ownership level from last period to the current period (ΔIO_t). If institutional investors are smarter than other investors and they trade on private information, the change in institutional ownership (ΔIO_t) can predict future return. However, if the growth in the institutional share of the market causes "demand shocks" in the stocks preferred by institutions, the lagged institutional ownership level (IO_{t-1}) can predict future returns. Yan and Zhang (2009) use the same approach of decomposition and find that both the demand shock and trading by short-term investors, instead of long-term investors, can predict the future return in the next quarter and the next year.

Intuitively, the negative relationship between bank failure and institutional ownership variables found in previous sections can be induced by persistent demand shocks or informational advantage of institutional investors over consecutive quarters. To investigate this issue, we decompose an institutional ownership variable into its value lagged two or more quarters and a change variable from that lagged value to the current period and redo the previous tests. For simplicity, we decompose the shareholding level in the last quarter into shareholding level lagged two quarters and the change in shareholding proportion in last quarter ($IO_{t-1} = IO_{t-2} +(IO_{t-1}-IO_{t-2})=IO_{t-2}+\Delta IO_{t-1}$). We replace the lagged institutional ownership variables with these two components in the logit probability regression model and estimate the related coefficients.

The estimation results are reported in Table 6 with failure window of one quarter ahead (columns (1)-(3)), four quarters ahead (columns (4)-(6)) and seven quarters ahead (columns (7)-(9)). The decomposition of institutional ownership proportion (prop) in columns (1), (4), and (7) of Table 6 shows that the predicative power of lagged shareholding proportion is mainly driven by persistent demand shock since the coefficients of lagged proportion are all negative and significant and the coefficient of change in shareholding proportion is only significant in four quarters ahead failure window (column (4)). However, the five largest institutional investors do trade on private information since in columns (2), (5), and (8), both lagged and change in ownership variables present negative and significant coefficients. In the decomposition of shareholding proportions of dedicated, indexer and transient investors (prop_ded, prop_qix, prop_tra) reported in columns (3), (6), and (9), the coefficients of the change in shareholding proportion of quasi-indexers (Δprop_qix) are negative and significant in the four and seven quarters ahead failure windows (columns (6) and (9)) and that of dedicated investors (Δprop_ded) is negative and significant in the four quarters ahead failure window (column (6)), indicating that quasi-indexer and dedicated investors can trade

on private information. Although quasi-indexers have more diversified portfolios than dedicated investors, the aggregated holding proportion of quasi-indexers is much larger than that of dedicated investors (26.957% versus 3.831% in Table 1) and it is reasonable that quasi-indexers spend a long time in monitoring and collecting private information as dedicated investors since both categories have low portfolio turnovers.

7. Bank failure and institutional ownership, conditional on bank financial distress

DeYoung and Torna (2013) find that engaging in nontraditional banking activities increases the probability that an already financially distressed bank will fail. Cole and White (2012) define "technical failure" or financially distressed banks as banks whose sum of equity and loan loss reserves are less than half of the value of their nonperforming assets. Nonperforming assets are defined as the sum of loans past due 30-89 days and still accruing interest, loans past due 90+ days and still accruing interest, nonaccrual loans, and foreclosed real estate. According to the above definition, we found 174 technically failed banks during the sample period (2002-2011), 39 of which failed after 3 to 4 quarters. Our aim is to investigate the role played by institutional investors in the failure process of these financially distressed banks.

To this end, we define a financial distress dummy that takes the unit value for banks identified as financially distressed banks, and zero otherwise. Following DeYoung and Torna (2013), we add an interaction terms between financial distress dummy and institutional ownership variables as a regressor to the model and report the estimation results of one to five quarters ahead failure windows in columns (1)-(5) of Table 7. The coefficients of financial distress dummy are mostly positive and significant except for column (2), implying that financially distressed banks are more likely to fail. The coefficients of the interaction term between the financially distress dummy and shareholding proportion of dedicated investor (FD dummy*prop_ded) are negative and significant

in two, three, and four quarters ahead failure windows, suggesting that when dedicated investors are present, financially distressed banks are less likely to fail in two to four quarters ahead. However, we do not see the same effect for quasi-indexers. On the contrary, the interaction term between financial distress dummy and shareholding proportion of quasi-indexer (FD dummy*prop_qix) is positive and significant in two and three quarters ahead failure windows, indicating that with quasi-indexers, financially distressed banks are more likely to fail in two and three quarters.

8. Bank failure outcomes and institutional ownership

By combining the information from the bank failure list and the UCLA-LoPucki Bankruptcy Research Database, we can identify the outcomes of 60 bank failures during 2002-2012 and their associated institutional ownership variables. In order to identify the role of institutional investors, we use a t-test to investigate whether the measures of institutional ownership are identical between failed banks that filed for chapter 7 liquidation and failed banks acquired by other banks during and before the filing quarter. The institutional ownership variables used for this purpose include: Prop, Prop of dedicated investors, number of investors, non-zero-points and maintain-stake-points durations. The t-tests results are reported in Table 8. We find that the proportion of dedicated investors is significantly higher in banks acquired by other banks than in banks that filed for liquidation in two and three quarters before the filing date. This suggests that dedicated investors were able to better handle the distress conditions of the banks they owned and were able to find a better solution, namely a merger, rather than Chapter 7 bankruptcy. Moreover, the non-zero-points duration is significantly longer in the case of acquired banks than in the case of liquidated banks in two, three, four and seven quarters before the filing date. This finding confirms the results on the proportion of institutional ownership. Similarly, the maintain-stake-points duration is

significantly longer in acquired banks than in liquidated banks in filing quarters, two, three, four and seven before the filing date indicating robustness of our two earlier findings. In brief, this evidence indicates that institutional investors with longer term holdings and dedicated investment strategy play a positive role in reducing the losses of shareholders in the bank failure process.

9. Robustness: Propensity Score Matching

As indicated in Shipman et al. (2017), propensity score matching can address the potential bias of "functional form misspecification" (FFM) including non-linearity to a larger extent than multiple regression (MR) such as the logit probability regression model employed here. To be specific, if the relationship between bank failure and institutional ownership is not linear, the logit regression model is improperly specified. As a result, the "zero conditional mean assumption" of the error term in the model will be violated and the coefficient estimates will be biased. The propensity score matching method can address this endogeneity issue, called functional form misspecification, by eliminating the difference between high institutional ownership (treated) and low institutional ownership (untreated) groups in terms of other control variables used in the multiple regression model.

To conduct the propensity score matching procedure to further investigate the relationship between bank failure and institutional ownership, we define a high (low) institutional ownership group according to the yearly median value of institutional ownership proportion (prop), ownership proportion of the largest 5 institutional investors (prop5) and the dedicated institutional investors (prop_ded). The matched group is then constructed according to the likelihood that an observation will be in high institutional ownership group conditional on the other control variables used in the multiple regression model. In the first step, we use the probit model to estimate the probability of being a high institutional ownership observation. In the second step, we use the

propensity scores based on the probabilities from the first step to do the matching. In this step, we use the nearest-neighbor matching technique which allows four nearest matches. In the third step, we use Abadie and Imbens (2006) standard errors to estimate the average treatment effect of the treated (ATET).

The results are presented in Table 9, with column (1), (2) and (3) showing the effects of the three institutional ownership variables (prop, prop5 and prop_ded), respectively. According to these results, the ownership proportion of dedicated institutional investors (prop_ded), reported in column (3), shows the strongest support for our primary results, discussed in Section 4, purporting that ownership by dedicated institutional investors is negatively associated with probability of bank failure. The treated group (i.e., observations with high ownership proportion of dedicated institutional investors) has a significantly lower probability of bank failure than the untreated group (i.e., observations with low ownership proportion of dedicated institutional investor). This result holds for two, three, six, seven, eight and nine quarters ahead windows of the filing date. The shareholding proportion of the five largest institutional investors (prop_5) in column (2) exhibits significant treatment effects on bank failure in one, two, three and four quarters ahead window of the filing date. The aggregated ownership proportion effect (prop) in column (1) is only significant in eight quarters ahead of the filing date. The much weaker effects of the aggregated proportion and proportion of the largest five investors can be explained by the fact that the propensity matching procedure eliminates a substantial portion of the sample by excluding many bank observations with high institutional ownership variables without failing (Shipman et al., 2017; Cram et al. 2009).

10. Conclusion

There are over 5000 FDIC-insured commercial banks in the US and their failures exposes the FDIC and taxpayers to a substantial level of costs. Institutional investors have become the largest shareholders of most of the publicly-traded firms including banks. Thus, it is of great importance to study the function of market discipline performed by institutional investors in the banking industry. We investigate the relationship between institutional ownership level of banks before their failure and their probability of failure. We find strong evidence that institutional investors play an important role in collecting information and monitoring the management of banks. Institutional investors have significantly lower shareholding in failing banks relative to surviving banks even nine quarters before the closing date based on univariate t-tests. With logit probability model of failure, after controlling other relevant variables, institutional ownership variables can predict bank failure eight quarters before the closing date and this relationship is qualitatively robust to the propensity score tests. Furthermore, this relationship is stronger in smaller banks and banks with more complex organizational structure. Quasi-indexer and dedicated institutional investors can trade on private information before bank failure as indicated by the changes in their shareholding proportions. However, only dedicated investors can reduce the failure probability of distressed banks according to the regression of bank failure conditional on financial distress. Longer non-zero-points and maintain-stake-points durations are associated with better bank failure outcomes, namely being acquired by another bank, rather than going through chapter 7 bankruptcy.

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Figure 1. Number of bank failures and Proportion of bank failures out of all commercial banks in the U.S. (2000-2011)

This figure displays the historical number of bank failures (black line) and the proportion of bank failures relative to the number of commercial banks (dotted line). (Data source: https://fred.stlouisfed.org/)

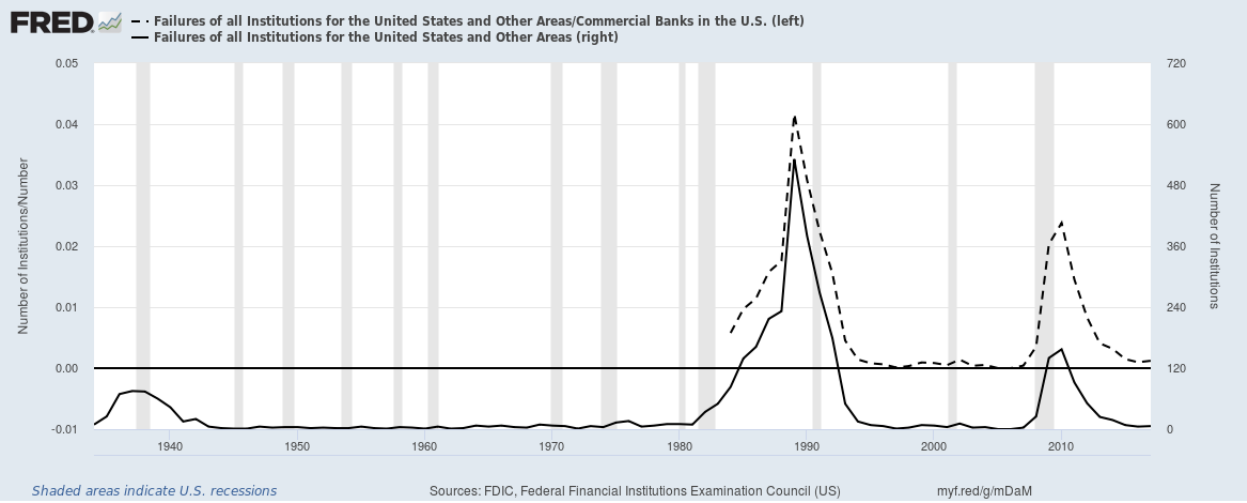

Figure 2: Institutional Ownership Proportions before Bank Failure Dates

This figure describes the institutional ownership shareholding proportions 20 quarters before the closing dates of bank failures. As defined in Table 1, prop, prop5, prop_ded, prop_qix, and prop_tra are aggregate shareholding proportion, shareholding proportion of 5 largest investors, and shareholding proportions of dedicated, quasi-indexer and transient investors. Data source: The closing dates and bank names are from FDIC websit. Institutional ownership variables are from Thomson Financial 13f database.

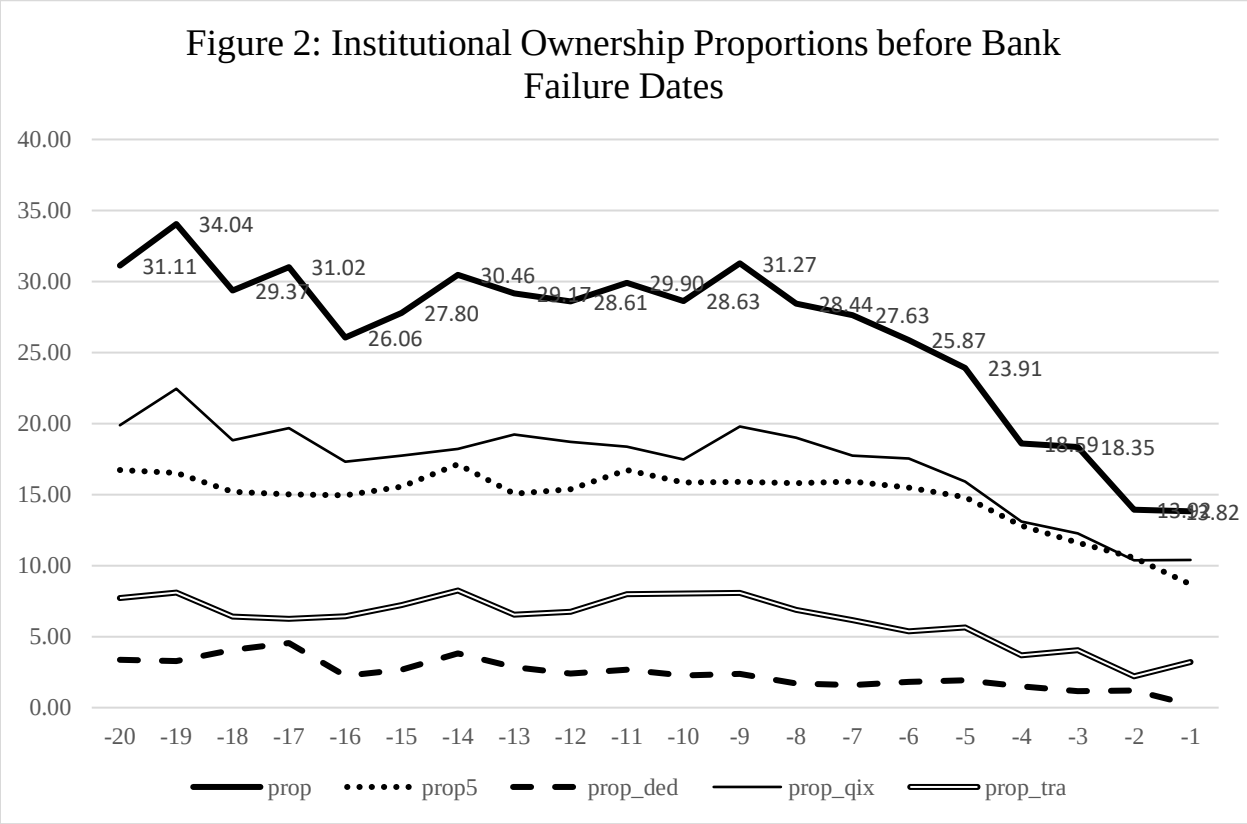

Figure 3. Institutional Ownership Durations before the Closing Dates

This figure describes the institutional ownership shareholding proportions 20 quarters before the closing dates of bank failures. As defined in Table 1, non-zero points is the number of quarters in which an institutional investor has non-zero holdings out of the 20 quarters including current and previous 19 quarters. Maintain stake points is the number of quarters in which an institutional investor maintains his stake (either keeps the same proportion or increases the holding) out of the 20 quarters. (Data source: The closing dates and bank name are from the FDIC website. Institutional ownership variables are from Thomson Financial 13f database).

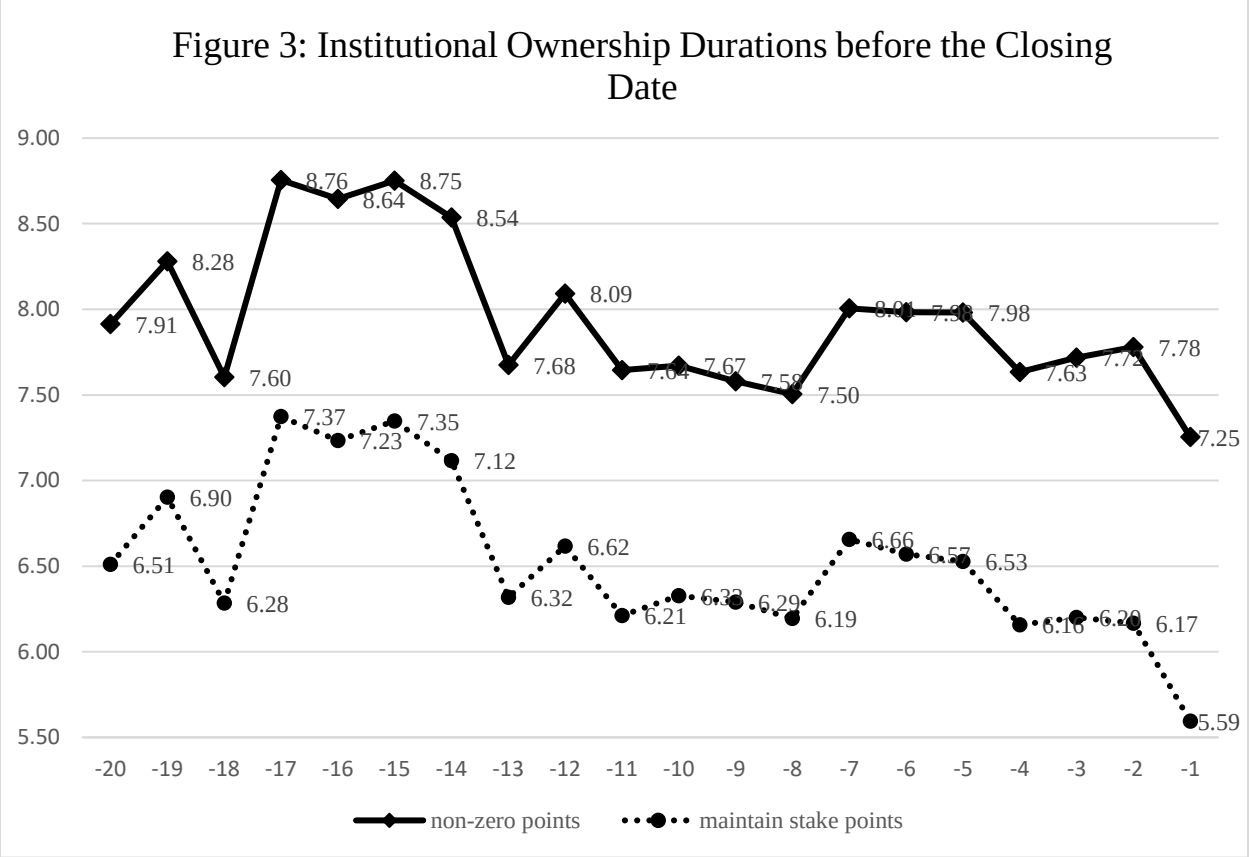

Table 1. Variable Definitions and Sample Statistics

This table presents variable definitions, mean and standard deviation values for our full sample, surviving banks and failed banks during the 2002-2011 period. The last column lists the difference of the variable means. t-statistics of the differences are shown in parenthesis. *, **, and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Row #	Variable	Definition	all banks (N = 19956)		Survive (N=18841)		Fail (N=1115)		Survive-Fail (t-statistics)
			Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	
	prop	Aggregate institutional ownership Proportion (%)	37.510	22.207	38.132	22.210	26.989	19.344	11.143*** (16.39)
1	Prop5	Proportion of 5 largest institutional investors (%)	16.513	8.142	16.635	8.123	14.431	8.195	2.204*** (8.76)
2	prop_ded	Proportion of permanent Dedicated investors (%)	3.831	6.210	3.922	6.260	2.303	5.052	1.618*** (8.47)
3	prop_qix	Proportion of permanent Quasi-indexers (%)	26.957	16.035	27.481	16.001	18.098	13.883	9.383*** (21.73)
4	prop_tra	Proportion of permanent Transient investors (%)	6.357	6.502	6.373	6.470	6.091	7.019	0.282 (1.41)
5	mpoints	the number of quarters in which an institutional investor has non-zero holdings out of the 20	9.555	3.395	9.636	3.364	8.192	3.613	1.444*** (13.87)
6	mpointsMaintain	the number of quarters in which an institutional investor maintains his stake (either keeps the	7.356	3.578	7.391	3.572	6.769	3.619	0.621*** (5.64)
7	ROA	net income divided by total assets	0.005	0.015	0.005	0.013	-0.005	0.026	0.011*** (23.73)
8	Net Interest	Interest income minus interest expense, divided by total assets, per $1000 of assets (DeYoung	21.388	12.375	21.424	12.394	20.772	12.046	0.652* (1.71)
9	stakeholder	sum of income from venture capital, insurance underwriting and trading activities,	0.436	3.649	0.452	3.740	0.163	1.360	0.290*** (5.91)
10	fee-for-service	income from servicing, brokerage, and insurance sales, per $1000 of assets	0.312	2.152	0.329	2.179	0.025	1.603	0.305*** (6.02)
11	traditional Fee	noninterest income minus stakeholder income and fee for service income, per $1000 of assets	9.205	36.747	9.524	37.749	3.809	7.602	5.720*** (16.01)

12	Brokered deposits	brokered deposits divided by total assets	0.041	0.086	0.036	0.081	0.125	0.119	-0.089*** (-24.79)
13	Core deposits	total deposits minus brokered deposits, divided by total assets; following Scharfstein and	0.594	0.168	0.596	0.170	0.569	0.135	0.0273*** (5.26)
14	RER14	Real estate residential single-family (1-4) mortgages divided by total assets; following	0.173	0.129	0.176	0.130	0.116	0.090	0.061*** (21.12)
15	remul	Real estate multifamily mortgages divided by total assets; following Cole and White (2012)	0.019	0.037	0.018	0.034	0.040	0.070	-0.022*** (-10.46)
16	recon	Real estate construction & development loans divided by total assets; following Cole and	0.036	0.075	0.031	0.062	0.131	0.158	-0.010*** (-21.01)
17	recom	Real estate nonfarm nonresidential mortgages divided by total assets; following Cole and	0.074	0.124	0.070	0.120	0.144	0.159	-0.074*** (-15.16)
18	CI	Commercial & Industrial loans divided by total assets; following Cole and White (2012)	0.122	0.130	0.124	0.131	0.089	0.097	0.034*** (11.25)
19	cons	Consumer loans divided by total assets (Cole and White, 2012)	0.017	0.100	0.018	0.103	0.003	0.005	0.016*** (20.44)
20	LLR	loan loss reserve divided by total assets (Cole and White, 2012)	0.011	0.008	0.010	0.008	0.015	0.010	-0.004*** (-15.58)
21	SEC	sum of securities held-to-maturity and available-for-sale divided by total assets (Cole	0.170	0.143	0.173	0.144	0.116	0.110	0.057*** (16.38)
22	goodwill	intangible assets: Goodwill divided by total assets(Cole and White, 2012)	0.018	0.034	0.018	0.034	0.011	0.022	0.007*** (10.43)
23	nonperforming	non-performing assets divided by total assets (Cole and White, 2012)	0.006	0.015	0.005	0.011	0.024	0.043	-0.019*** (-41.48)
24	effic	efficiency ratio (total noninterest expense/(net interest income+ total noninterest income))	0.671	0.775	0.662	0.650	0.814	1.894	-0.152*** (-6.38)
25	ue	State-level unemployment rate (%; seasonally adjusted) (DeYoung and Torna, 2013)	5.885	1.962	5.863	1.941	6.272	2.272	-0.409*** (-6.62)
26	pct_chng	Growth in state-level housing prices (%; seasonally adjusted) (DeYoung and Torna,	0.007	0.023	0.008	0.023	-0.004	0.032	0.012*** (12.32)
27	pigrowth	Growth in state-level personal income (%; seasonally adjusted) (DeYoung and Torna,	0.938	1.308	0.947	1.286	0.778	1.649	0.169*** (4.10)

Table 2. Quarterly Institutional Ownership Characteristics Comparison between Failed and Surviving Banks

This table compares institutional ownership characteristics including aggregated shareholding proportion (Prop), shareholding proportion of 5 largest investors (Prop5), non-zero-points, maintain-stake-points durations and shareholding proportions of permanent dedicated, permanent quasi-indexers, and permanent transient investors between banks failed (fail=1) and bank survived (fail=0) over nine quarters including the filing quarter and previous 8 quarters. For each institutional ownership variable category, the first and second row show the variable mean for banks failed and survived at a quarter before fling quarter, respectively. The third and fourth row report the mean and t-statistics for the difference between the first and second row. The last two rows of the table show the number of observations for each quarter over the nine quarters. T-statistics are shown in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

	Time	Quarter-1	Quarter-2	Quarter-3	Quarter-4	Quarter-5	Quarter-6	Quarter-7	Quarter-8	Quarter-9
Prop (%)	Fail =0	38.1324	38.1324	38.1324	38.1324	38.1324	38.1324	38.1324	38.1324	38.1324
	Fail =1	13.8203	14.3062	18.4465	18.7973	23.9142	25.8715	27.6295	28.4363	31.2724
	0-1	24.3121	23.8262	19.6859	19.3351	14.2182	12.261	10.5029	9.6961	6.86
	t-value	10.49***	14.07***	6.26***	9.05***	4.43***	3.78***	3.20***	2.96***	2.05**
Prop5 (%)	Fail =0	16.6349	16.6349	16.6349	16.6349	16.6349	16.6349	16.6349	16.6349	16.6349
	Fail =1	8.6805	10.9458	11.8649	13.0687	14.8102	15.4859	15.9084	15.8113	15.8833
	0-1	7.9544	5.6891	4.77	3.5663	1.8247	1.149	0.7265	0.8236	0.7517
	t-value	7.41***	4.43***	4.10***	3.07***	1.55	0.97	0.59	0.69	0.61
Non-zero-points	Fail =0	9.6361	9.6361	9.6361	9.6361	9.6361	9.6361	9.6361	9.6361	9.6361
	Fail =1	7.2545	8.0175	7.7716	7.6875	7.9813	7.9825	8.0065	7.5043	7.5799
	0-1	2.3816	1.6185	1.8645	1.9486	1.6548	1.6536	1.6296	2.1318	2.0562
	t-value	5.14***	3.11***	3.91***	4.05***	3.40***	3.36***	3.28***	4.29***	4.05***
Maintain-stake-points	Fail =0	7.3905	7.3905	7.3905	7.3905	7.3905	7.3905	7.3905	7.3905	7.3905
	Fail =1	5.5947	6.4024	6.2641	6.2189	6.5269	6.5707	6.6571	6.1941	6.2898
	0-1	1.7958	0.9882	1.1264	1.1716	0.8637	0.8198	0.7334	1.1964	1.1007
	t-value	3.88***	1.79*	2.23**	2.29**	1.67*	1.57	1.39	2.27**	2.04**
Prop_ded	Fail =0	3.9217	3.9217	3.9217	3.9217	3.9217	3.9217	3.9217	3.9217	3.9217
	Fail =1	0.206	1.2186	1.1052	1.4468	1.9287	1.8033	1.591	1.6916	2.3732
	0-1	3.7157	2.7031	2.8165	2.4749	1.993	2.1184	2.3307	2.2301	1.5485
	t-value	20.95***	4.15***	6.61***	5.57***	3.73***	3.84***	4.47***	5.25***	3.00***
Prop_qix	Fail =0	27.481	27.481	27.481	27.481	27.481	27.481	27.481	27.481	27.481
	Fail =1	10.3959	10.6301	12.5567	13.3708	15.9102	17.5367	17.7414	19.0032	19.7899
	0-1	17.0851	16.8508	14.9243	14.1102	11.5708	9.9442	9.7395	8.4777	7.6911
	t-value	9.45***	12.29***	9.73***	8.97***	5.00***	4.26***	4.12***	3.59***	3.18***
Prop_tra	Fail =0	6.3731	6.3731	6.3731	6.3731	6.3731	6.3731	6.3731	6.3731	6.3731
	Fail =1	3.206	2.3195	3.9228	3.6934	5.6443	5.3719	6.1585	6.8763	8.0846
	0-1	3.1671	4.0536	2.4503	2.6797	0.7288	1.0012	0.2146	-0.5032	-1.7115
	t-value	2.72***	8.37***	1.34	4.31***	0.80	1.06	0.22	-0.53	-1.75*
# obs	Fail =0	18841	18840	18840	18841	18841	18841	18841	18841	18841
	Fail =1	31	42	50	49	48	47	46	46	44

Table 3. the probability of bank failure based on lagged institutional ownership and bank information: Logit specification

Panel A, B, and C display the estimation results of logit regression of bank failure probability, lagged intuitional ownership variables and other control variables. Panel A, B, and C report one to three, four to seven, and eight to nine quarters ahead failure window results. In each bank failure window, we include three sets of institutional ownership variables: aggregated shareholding proportion (prop), shareholding proportion of five largest institutional investors (prop5) and shareholding proportion of dedicated (prop_ded), quasi-indexer (prop_qix) and transient investors (prop_tra). All variables are defined in Table 1. Standard errors are clustered at the bank level. T-statistics are below the coefficients. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

Table 3 Panel A. Logit estimation of probability of bank failure (Quarter t-1-Quarter t-3)

	One quarter ahead			Two quarters ahead			Three quarters ahead		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
prop	-0.107***			-0.124***			-0.066**		
	(-3.41)			(-2.95)			(-2.04)		
prop5		-0.293***			-0.214***			-0.172***	
		(-3.54)			(-3.83)			(-3.51)	
prop_ded			-0.365*			-0.078			-0.177
			(-1.81)			(-1.16)			(-1.21)
prop_qix			-0.113***			-0.123***			-0.102**
			(-2.64)			(-2.61)			(-2.56)
prop_tra			-0.071			-0.171*			0.012
			(-1.45)			(-1.79)			(0.43)
stakeholder	213.021*	157.028	209.986***	167.706	187.502	182.467	-2.114	49.049	-2.971
	(1.73)	(1.20)	(2.75)	(1.03)	(1.13)	(0.94)	(-0.02)	(0.56)	(-0.02)
feeforserv	-85.601	-462.533	-78.233	-569.608*	-423.104	-561.932	85.805	60.423	92.324
	(-0.67)	(-0.42)	(-0.92)	(-1.66)	(-1.22)	(-1.59)	(0.97)	(0.47)	(0.76)
tradfee	12.843***	12.302***	14.884***	11.727***	8.034***	11.672***	7.634***	6.777***	8.602***
	(3.50)	(3.45)	(3.63)	(3.97)	(3.04)	(3.89)	(3.79)	(4.41)	(4.22)
ni	-138.123	-159.195*	-146.453*	-98.545***	-91.554***	-99.684***	-18.344	-27.545	-26.697
	(-1.63)	(-1.76)	(-1.77)	(-2.72)	(-2.67)	(-2.68)	(-0.87)	(-1.33)	(-1.22)
RER14	-4.479	0.321	-3.262	-5.970	-4.515	-6.039	-4.845	-2.784	-4.603
	(-0.74)	(0.05)	(-0.53)	(-1.15)	(-0.94)	(-1.16)	(-1.08)	(-0.65)	(-1.00)
remul	20.449***	24.243***	21.588***	18.925***	18.940***	19.515***	14.360***	16.108***	14.777***
	(3.27)	(3.24)	(3.37)	(4.51)	(5.24)	(4.48)	(3.94)	(4.53)	(3.77)
recon	15.822***	19.118***	15.806***	15.557***	15.471***	15.664***	11.907***	12.650***	11.576***
	(3.12)	(2.63)	(2.92)	(4.20)	(4.51)	(4.28)	(4.27)	(4.34)	(3.94)
recom	2.367	3.184	2.814	-0.346	-0.254	-0.242	-0.810	-0.380	-0.576
	(0.81)	(0.94)	(0.99)	(-0.11)	(-0.09)	(-0.08)	(-0.32)	(-0.15)	(-0.20)
ci	6.681*	5.810	7.112*	9.712***	7.187***	9.614***	5.446**	4.463*	5.961**
	(1.68)	(1.42)	(1.80)	(3.06)	(3.19)	(2.97)	(2.12)	(1.68)	(2.30)
cons	-7.670	0.707	-2.843	-5.091	-12.317	-6.696	-5.272	-15.769	-4.307
	(-0.53)	(0.06)	(-0.34)	(-0.41)	(-0.54)	(-0.35)	(-0.69)	(-0.48)	(-0.62)

roa	-62.679***	-68.183***	-62.017***	-52.671***	-49.254***	-51.728***	-28.778***	-26.758***	-29.210***
	(-3.58)	(-3.17)	(-3.71)	(-4.32)	(-4.20)	(-4.17)	(-4.29)	(-4.14)	(-4.50)
effic	0.006	0.066	-0.002	-0.036	-0.023	-0.032	0.002	0.023	-0.004
	(0.12)	(1.19)	(-0.05)	(-0.42)	(-0.28)	(-0.39)	(0.06)	(0.67)	(-0.11)
nonperforming	45.726***	47.872***	43.759***	34.242***	32.690***	33.566***	25.636***	25.605***	26.597***
	(4.11)	(4.70)	(4.30)	(3.18)	(3.10)	(3.15)	(3.18)	(3.30)	(3.31)
llr	-55.021	-35.982	-50.504	-7.917	-0.317	-4.430	1.345	14.497	3.820
	(-1.17)	(-0.94)	(-1.23)	(-0.22)	(-0.01)	(-0.12)	(0.05)	(0.58)	(0.12)
sec	2.326	4.921	2.980	0.223	0.204	0.395	0.841	1.098	0.665
	(0.64)	(0.95)	(0.84)	(0.06)	(0.06)	(0.10)	(0.24)	(0.32)	(0.19)
coredeposits	-0.665	0.697	-0.876	0.170	0.177	0.198	0.116	0.079	-0.092
	(-0.29)	(0.24)	(-0.41)	(0.08)	(0.08)	(0.09)	(0.08)	(0.05)	(-0.06)
brokereddeposits	1.179	4.562	0.989	3.306	3.863*	3.453	4.115**	4.771**	3.960**
	(0.40)	(1.33)	(0.33)	(1.31)	(1.68)	(1.35)	(2.31)	(2.55)	(2.33)
goodwill	-117.350	-93.904	-114.256	-62.935	-63.155	-59.264	-65.774	-68.524*	-69.999
	(-1.22)	(-1.12)	(-1.34)	(-1.15)	(-1.61)	(-1.15)	(-1.50)	(-1.69)	(-1.61)
ue	0.448**	0.455***	0.434**	0.251*	0.268**	0.255*	0.201**	0.177*	0.142
	(2.52)	(2.64)	(2.22)	(1.84)	(2.10)	(1.91)	(2.03)	(1.89)	(1.51)
pct_chng	21.842	22.786	12.128	17.325	13.177	17.821	-13.383	-19.919**	-20.188*
	(1.39)	(1.02)	(0.73)	(1.42)	(1.03)	(1.44)	(-1.29)	(-1.97)	(-1.83)
pigrowth	0.118	0.148	0.094	-0.129	-0.165	-0.129	-0.061	-0.108	-0.118
	(0.53)	(0.55)	(0.42)	(-1.17)	(-1.49)	(-1.19)	(-0.54)	(-0.94)	(-1.00)
Constant	-10.145***	-12.167**	-10.202***	-8.251***	-8.164***	-8.348***	-8.409***	-8.120***	-7.670***
	(-3.10)	(-2.56)	(-2.82)	(-2.95)	(-3.19)	(-2.97)	(-4.01)	(-3.77)	(-3.42)
Pseudo R2	0.7804	0.8081	0.7851	0.7346	0.7121	0.7362	0.6433	0.6644	0.6658
number of failed banks	31	31	31	41	41	41	50	50	50
number of banks/clusters	518	516	518	526	526	526	532	530	532
Observations	18,872	18,841	18,871	18,880	18,848	18,879	18,887	18,856	18,886

	Table 3 Panel B. Logit estimation of probability of bank failure (Quarter t-4-Quarter t-6)								
	Four quarters ahead			Five quarters ahead			Six quarters ahead		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
prop	-0.081***			-0.044**			-0.042**		
	(-3.01)			(-2.14)			(-2.45)		
prop5		-0.147***			-0.094**			-0.083**	
		(-3.75)			(-2.46)			(-2.33)	
prop_ded			-0.095			-0.101			-0.127*
			(-1.24)			(-1.37)			(-1.94)
prop_qix			-0.094***			-0.060**			-0.058**
			(-3.02)			(-2.18)			(-2.34)
prop_tra			-0.035			0.020			0.022
			(-0.63)			(0.80)			(0.81)
stakeholder	-266.873	-268.378	-291.869	23.491	24.156	23.558	-43.436	-53.867	-89.534
	(-0.53)	(-0.49)	(-0.56)	(0.29)	(0.38)	(0.24)	(-0.12)	(-0.14)	(-0.19)
feeforserv	-16.396	-43.216	2.153	10.463	-4.041	19.368	-19.717	-62.980	-17.701
	(-0.05)	(-0.19)	(0.01)	(0.09)	(-0.03)	(0.15)	(-0.06)	(-0.19)	(-0.05)
tradfee	6.458***	4.646***	6.361***	2.097	1.483	1.826	2.331	1.881	2.160
	(4.15)	(3.34)	(3.89)	(0.62)	(0.32)	(0.54)	(0.63)	(0.55)	(0.50)
ni	-52.017***	-52.191***	-53.660***	-35.916*	-35.331*	-39.515*	-26.394	-25.567	-29.922*
	(-2.70)	(-2.85)	(-2.82)	(-1.75)	(-1.72)	(-1.89)	(-1.57)	(-1.52)	(-1.75)
RER14	-3.585	-2.353	-3.696	-2.790	-1.909	-2.593	0.433	1.336	0.599
	(-0.84)	(-0.59)	(-0.85)	(-0.72)	(-0.49)	(-0.68)	(0.10)	(0.33)	(0.14)
remul	14.795***	14.272***	14.585***	14.437***	14.635***	14.636***	14.948***	14.545***	15.851***
	(3.63)	(4.09)	(3.50)	(4.48)	(4.98)	(4.60)	(4.07)	(4.22)	(4.12)
recon	13.544***	14.293***	13.462***	14.783***	15.247***	14.292***	16.570***	16.787***	16.018***
	(5.21)	(5.52)	(5.28)	(6.35)	(6.36)	(6.25)	(6.34)	(6.56)	(6.01)
recom	1.333	1.615	1.315	1.706	2.031	1.630	4.373	4.525*	4.380
	(0.49)	(0.64)	(0.47)	(0.74)	(0.90)	(0.70)	(1.57)	(1.69)	(1.53)
ci	5.012*	3.898	4.934	4.727*	4.025	4.644*	5.799**	4.997*	5.593*
	(1.65)	(1.39)	(1.63)	(1.77)	(1.55)	(1.72)	(2.01)	(1.89)	(1.87)
cons	-0.283	-0.261	-0.200	2.345	1.771	2.642	1.902	1.565	1.948
	(-0.06)	(-0.06)	(-0.05)	(0.70)	(0.58)	(0.76)	(0.65)	(0.58)	(0.61)
roa	-11.518	-9.606	-11.683	-7.799	-7.094	-6.784	0.354	-0.164	0.667
	(-1.56)	(-1.32)	(-1.51)	(-1.12)	(-1.00)	(-0.95)	(0.04)	(-0.02)	(0.07)
effic	0.057	0.074	0.051	0.144***	0.152***	0.141***	-0.098**	-0.085*	-0.099**
	(0.89)	(1.13)	(0.78)	(4.21)	(4.34)	(4.04)	(-2.18)	(-1.75)	(-2.18)
nonperforming	19.143**	20.435**	18.806**	16.027**	17.426**	16.525**	9.325	11.406*	9.063
	(2.27)	(2.55)	(2.11)	(2.13)	(2.38)	(2.14)	(1.44)	(1.73)	(1.39)

llr	19.182	21.837	20.201	7.062	6.879	6.934	37.884**	32.191*	42.314**
	(0.57)	(0.74)	(0.55)	(0.25)	(0.28)	(0.23)	(2.11)	(1.87)	(2.26)
sec	0.756	0.955	0.621	1.429	1.319	0.694	5.115	4.712	4.674
	(0.21)	(0.28)	(0.18)	(0.44)	(0.43)	(0.22)	(1.46)	(1.52)	(1.29)
coredeposits	-1.084	-1.026	-1.020	-0.695	-0.765	-0.616	-1.457	-1.654	-1.258
	(-0.84)	(-0.80)	(-0.79)	(-0.55)	(-0.62)	(-0.47)	(-0.93)	(-1.14)	(-0.78)
brokereddeposits	5.661***	5.707***	5.631***	5.585***	5.664***	5.357***	6.117***	6.178***	6.084***
	(2.93)	(3.27)	(2.88)	(3.72)	(4.03)	(3.40)	(4.10)	(4.56)	(3.83)
goodwill	-14.233	-18.904	-15.574	-16.248	-20.561	-21.128*	-1.370	-5.658	-4.224
	(-0.90)	(-1.13)	(-0.97)	(-1.35)	(-1.64)	(-1.69)	(-0.12)	(-0.48)	(-0.34)
ue	0.108	0.126	0.104	0.165**	0.173**	0.137	-0.015	-0.010	-0.052
	(0.99)	(1.17)	(0.95)	(2.10)	(2.25)	(1.62)	(-0.16)	(-0.11)	(-0.53)
pct_chng	-13.418	-15.428*	-13.853	-24.462***	-26.485***	-26.702***	-23.277***	-24.028***	-25.910***
	(-1.59)	(-1.78)	(-1.64)	(-3.88)	(-4.01)	(-4.23)	(-3.77)	(-3.93)	(-4.02)
pigrowth	-0.323***	-0.342***	-0.329***	0.085	0.069	0.063	-0.323***	-0.338***	-0.328***
	(-2.79)	(-2.90)	(-2.86)	(0.50)	(0.39)	(0.36)	(-3.74)	(-3.82)	(-3.61)
Constant	-7.234***	-7.496***	-7.113***	-9.258***	-9.248***	-8.768***	-9.922***	-9.707***	-9.561***
	(-3.08)	(-3.23)	(-3.06)	(-5.39)	(-5.35)	(-5.24)	(-3.70)	(-3.81)	(-3.46)
Pseudo R2	0.591	0.5829	0.5942	0.5375	0.5361	0.5471	0.5279	0.5218	0.5407
number of failed banks	49	49	49	47	47	47	47	47	47
number of banks/clusters	531	530	531	533	532	533	532	531	532
Observations	18,886	18,856	18,885	18,887	18,857	18,886	18,886	18,856	18,885

Table 3 Panel C. Logit estimation of probability of bank failure (Quarter t-7-Quarter t-9)									
	Seven quarters ahead			Eight quarters ahead			Nine quarters ahead		
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
prop	-0.031**			-0.027**			-0.018		
	(-2.36)			(-1.98)			(-1.44)		
prop5		-0.062*			-0.056			-0.053	
		(-1.95)			(-1.61)			(-1.40)	
prop_ded			-0.151*			-0.190**			-0.095
			(-1.92)			(-2.30)			(-1.52)
prop_qix			-0.047**			-0.037*			-0.038*
			(-2.32)			(-1.94)			(-1.94)
prop_tra			0.016			0.042***			0.046***
			(0.78)			(2.60)			(2.89)
stakeholder	-34.916	-62.576	-43.015	-201.067	-207.136	-192.488	-4.248	-24.789	8.688
	(-0.13)	(-0.21)	(-0.15)	(-0.43)	(-0.42)	(-0.38)	(-0.03)	(-0.12)	(0.05)
feeforserv	-201.921	-137.496	-192.800	-418.276**	-398.121**	-466.697***	-48.695	-3.714	-81.454
	(-0.62)	(-0.54)	(-0.60)	(-2.36)	(-2.47)	(-2.73)	(-0.19)	(-0.02)	(-0.24)
tradfee	-11.107	-5.113	-8.392	-42.909	-43.453	-36.105	-71.612	-58.566	-63.149
	(-0.24)	(-0.15)	(-0.17)	(-0.62)	(-0.66)	(-0.50)	(-1.15)	(-0.85)	(-0.93)
ni	44.811***	39.940**	38.602**	-15.568	-17.111	-22.919	5.527	-3.599	1.370
	(2.67)	(2.49)	(2.04)	(-0.81)	(-0.90)	(-1.16)	(0.23)	(-0.15)	(0.06)
RER14	-2.096	-2.547	-2.162	-2.834	-2.281	-3.075	-3.718	-2.643	-3.504
	(-0.48)	(-0.56)	(-0.50)	(-0.68)	(-0.57)	(-0.77)	(-0.90)	(-0.63)	(-0.88)
remul	13.335***	13.078***	14.300***	10.386***	10.023***	11.070***	10.522***	11.256***	11.180***
	(4.26)	(4.18)	(4.24)	(3.49)	(3.54)	(3.61)	(3.64)	(3.76)	(3.75)
recon	15.905***	16.823***	15.310***	15.516***	15.676***	14.687***	16.176***	17.109***	15.546***
	(6.35)	(6.52)	(5.81)	(6.61)	(6.75)	(6.19)	(7.73)	(7.60)	(7.43)
recom	3.080	3.388	3.184	2.079	2.231	2.163	1.936	2.819	2.144
	(1.21)	(1.28)	(1.24)	(0.92)	(1.03)	(0.98)	(0.93)	(1.25)	(1.08)
ci	4.544	3.909	4.387	3.385	2.817	2.648	3.807*	3.696	3.834*
	(1.62)	(1.43)	(1.49)	(1.29)	(1.13)	(0.99)	(1.70)	(1.60)	(1.70)
cons	-3.148	-2.882	-2.587	1.516	1.137	2.374	0.927	1.619	1.980
	(-0.91)	(-0.87)	(-0.67)	(0.62)	(0.48)	(0.93)	(0.36)	(0.63)	(0.79)
roa	-9.379	-9.597	-9.415	8.033	5.741	6.030	-10.567	-13.134	-12.559
	(-1.18)	(-1.25)	(-1.05)	(0.49)	(0.38)	(0.34)	(-0.91)	(-1.33)	(-0.99)
effic	-0.018	-0.030	0.037	-0.029	-0.004	0.009	-0.138	-0.146	-0.127
	(-0.13)	(-0.23)	(0.18)	(-0.10)	(-0.01)	(0.03)	(-1.50)	(-1.61)	(-1.16)
nonperforming	0.332	-1.432	-0.155	-7.329	-6.340	-7.566	-23.143	-25.701*	-22.122
	(0.04)	(-0.17)	(-0.02)	(-0.70)	(-0.60)	(-0.74)	(-1.55)	(-1.72)	(-1.60)

llr	24.410	25.455	24.628	9.982	4.504	8.639	5.582	5.556	2.560
	(1.14)	(1.36)	(0.96)	(0.50)	(0.23)	(0.37)	(0.22)	(0.26)	(0.09)
sec	4.646	4.752*	3.926	3.671	3.347	2.629	3.275	3.412	2.515
	(1.58)	(1.67)	(1.30)	(1.36)	(1.32)	(0.94)	(1.55)	(1.45)	(1.16)
coredeposits	-1.229	-1.496	-1.290	-2.409*	-2.437*	-2.303	-1.766	-1.530	-1.867
	(-0.91)	(-1.13)	(-0.86)	(-1.78)	(-1.82)	(-1.60)	(-1.29)	(-1.02)	(-1.33)
brokereddeposits	5.683***	5.853***	5.646***	4.667***	4.774***	4.767***	4.397***	4.155***	4.686***
	(4.95)	(5.24)	(4.28)	(3.69)	(3.94)	(3.41)	(3.57)	(3.07)	(3.64)
goodwill	-2.215	-3.696	-4.894	-2.893	-4.700	-5.975	-3.525	-4.438	-4.468
	(-0.21)	(-0.35)	(-0.45)	(-0.32)	(-0.52)	(-0.67)	(-0.42)	(-0.52)	(-0.53)
ue	0.016	0.063	-0.048	0.002	0.012	-0.064	-0.079	-0.046	-0.150
	(0.17)	(0.69)	(-0.45)	(0.02)	(0.11)	(-0.56)	(-0.57)	(-0.33)	(-1.08)
pct_chng	-14.264*	-14.971*	-18.181**	-24.516***	-25.137***	-28.365***	-11.795	-13.660	-14.428
	(-1.77)	(-1.88)	(-2.08)	(-3.41)	(-3.51)	(-3.70)	(-1.02)	(-1.22)	(-1.28)
pigrowth	0.012	0.002	0.014	0.111	0.113	0.125	0.108	0.103	0.102
	(0.08)	(0.01)	(0.09)	(0.95)	(0.93)	(0.99)	(0.94)	(0.90)	(0.86)
Constant	-10.316***	-10.511***	-9.363***	-7.243***	-7.148***	-6.353***	-7.176***	-7.610***	-6.376***
	(-4.79)	(-4.77)	(-4.17)	(-3.39)	(-3.39)	(-3.03)	(-4.09)	(-3.88)	(-3.87)
Pseudo R2	0.4691	0.4723	0.4883	0.4465	0.4426	0.4706	0.429	0.4408	0.4493
number of failed banks	46	46	46	46	46	46	44	44	44
number of banks/clusters	531	529	531	531	530	531	529	527	529
Observations	18,885	18,853	18,884	18,885	18,855	18,884	18,883	18,852	18,882

Table 4. Is the relationship between bank failure probability and IO variables associated with BHC organization complexity?

This table displays the estimation results of logit regression of bank failure probability, IO variables and BHC organization complexity. The organization complexity is measured by the ratio of net income of a bank to that of its head office BHC. LOW income share dummy is equal to one if the ratio of bank net income to that of its head office BHC in a specific year is below the median value in the year, otherwise zero. Prop* LOW income share dummy and Prop5* LOW income share dummy are the interaction terms between institutional ownership proportion (prop), the shareholding proportion of the 5 largest institutional investors, and LOW income share dummy, respectively. Other variables are defined in Table 1. Columns (1-2), (3-4), and (5-6) are based on the information from one quarter, four quarters and seven quarters before the quarter of bank failure, respectively. T-statistics are below the coefficients and shown in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

Table 4: the relationship between IO variable and bank income share interaction and the prob. of bank failure

VARIABLES	One quarter ahead		Four quarters ahead		Seven quarters ahead	
	(1)	(2)	(3)	(4)	(5)	(6)
Prop	-0.271**		-0.206**		-0.028	
	(-2.20)		(-2.32)		(-1.05)	
prop5		-0.431***		-0.301**		-0.050
		(-3.87)		(-2.18)		(-0.72)
LOW income share dummy	2.206	2.086	0.788	0.728	-2.133**	-2.494*
	(1.31)	(1.48)	(0.50)	(0.41)	(-1.99)	(-1.82)
Prop* LOW income share dummy	-0.215*		-0.152*		-0.003	
	(-1.65)		(-1.65)		(-0.11)	
Prop5* LOW income share dummy		-0.213*		-0.202		-0.006
		(-1.91)		(-1.43)		(-0.08)
stakeholder	113.829	181.805	-157.724	-214.844	-257.325	-304.628
	(0.56)	(0.70)	(-0.39)	(-0.46)	(-0.72)	(-0.75)
feeforserv	218.402**	-66.569	84.743*	72.916	-195.455	-112.298
	(2.49)	(-0.08)	(1.67)	(1.12)	(-0.43)	(-0.28)
tradfee	9.980***	11.297***	4.949**	3.728**	-51.929	-48.068
	(2.98)	(3.17)	(2.40)	(2.02)	(-0.90)	(-0.79)
ni	-112.511	-140.801	-37.747*	-41.645**	50.211***	46.859**
	(-1.30)	(-1.51)	(-1.88)	(-2.14)	(2.93)	(2.55)
RER14	-4.451	0.989	-3.288	-1.709	-2.178	-2.784
	(-0.83)	(0.17)	(-0.91)	(-0.48)	(-0.52)	(-0.62)
remul	16.162***	22.999***	10.408**	10.611***	9.569***	8.802***
	(2.88)	(3.16)	(2.35)	(2.83)	(3.00)	(2.71)
recon	13.609***	18.469**	11.903***	12.747***	14.042***	14.746***
	(2.78)	(2.42)	(4.24)	(4.43)	(6.22)	(5.99)
recom	-0.122	2.676	0.925	1.259	1.631	1.810
	(-0.03)	(0.72)	(0.32)	(0.46)	(0.68)	(0.72)

ci	2.835	4.891	-2.748	-2.871	-0.242	-1.561
	(0.65)	(1.17)	(-0.76)	(-0.78)	(-0.06)	(-0.35)
cons	-6.331	2.857	-3.624	-2.740	-7.043*	-6.700
	(-0.14)	(0.44)	(-0.48)	(-0.42)	(-1.76)	(-1.58)
roa	-52.845***	-60.737***	-2.628	-1.581	-1.928	-1.231
	(-3.14)	(-3.02)	(-0.28)	(-0.16)	(-0.22)	(-0.14)
effic	0.043	0.076	0.112	0.131	0.153	0.165
	(0.84)	(1.38)	(1.45)	(1.56)	(1.28)	(1.44)
nonperforming	50.715***	50.704***	18.517*	20.321**	-6.387	-8.874
	(4.03)	(5.29)	(1.84)	(2.12)	(-0.77)	(-1.05)
llr	-15.919	-18.048	48.957	46.879	55.217**	56.821***
	(-0.28)	(-0.42)	(1.24)	(1.21)	(2.49)	(2.75)
sec	2.560	5.722	0.149	0.452	2.347	2.119
	(0.74)	(1.16)	(0.04)	(0.13)	(0.73)	(0.67)
coredeposits	-1.830	0.373	-2.052	-1.869	-1.871	-2.201
	(-0.68)	(0.12)	(-1.43)	(-1.25)	(-1.23)	(-1.38)
brokereddeposits	3.038	4.605	7.694***	7.354***	6.451***	6.689***
	(0.89)	(1.28)	(3.91)	(4.08)	(5.16)	(5.32)
goodwill	-125.717	-96.690	-11.150	-15.625	-0.419	-1.272
	(-1.49)	(-1.24)	(-0.65)	(-0.84)	(-0.04)	(-0.11)
ue	0.442***	0.469**	0.140	0.159	-0.044	-0.004
	(2.67)	(2.48)	(1.24)	(1.38)	(-0.46)	(-0.04)
pct_chng	17.364	19.939	-18.675**	-20.622**	-16.611*	-17.287*
	(0.98)	(0.81)	(-1.97)	(-2.15)	(-1.94)	(-1.93)
pigrowth	0.079	0.109	-0.436***	-0.427***	-0.034	-0.047
	(0.26)	(0.33)	(-3.25)	(-3.13)	(-0.21)	(-0.27)
Constant	-7.715**	-11.232**	-5.881**	-6.419**	-9.904***	-10.243***
	(-2.34)	(-2.19)	(-2.21)	(-2.31)	(-4.79)	(-4.34)
Pseudo R2	0.7925	0.8084	0.6376	0.6286	0.4868	0.4994
number of failed banks	31	31	49	49	46	46
number of banks/clusters	451	449	463	462	464	462
Observations	14,894	14,867	14,907	14,881	14,907	14,879

Table 5. Is the relationship between bank failure probability and IO variable associated with bank size?

This table displays the estimation results of logit regression of bank failure probability, IO variables and bank size. Bank size is measured by the book value of total assets. Small size dummy is equal to one if the size of a bank in a specific year is below the median value in the year, otherwise zero. Prop* Small size dummy and Prop5* Small size dummy are the interaction terms between institutional ownership proportion (prop), the shareholding proportion of 5 largest institutional investors, and small size dummy respectively. Other variables are defined in Table 1. Columns (1-2), (3-4), and (5-6) are based on the information from one quarter, four quarters and seven quarters ahead respectively. T-statistics are below coefficients and shown in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

Table 5: the relationship between IO variable and bank size and the prob. of bank failure

VARIABLES	One quarter ahead		Four quarters ahead		Seven quarters ahead	
	(1)	(2)	(3)	(4)	(5)	(6)
prop	-0.185*		-0.179***		-0.044*	
	(-1.79)		(-3.55)		(-1.68)	
prop5		-0.463***		-0.218***		-0.087
		(-3.51)		(-3.39)		(-1.55)
Small size dummy	1.700	1.864*	2.105**	1.798*	-0.218	0.045
	(1.30)	(1.70)	(2.22)	(1.88)	(-0.21)	(0.04)
Prop* Small size dummy	-0.136		-0.147***		-0.015	
	(-1.24)		(-2.61)		(-0.51)	
Prop5*Small size dummy		-0.269***		-0.158**		-0.038
		(-2.79)		(-2.19)		(-0.55)
stakeholder	148.128	212.949	-333.609	-336.255	-105.199	-128.807
	(1.35)	(0.92)	(-0.45)	(-0.45)	(-0.30)	(-0.32)
feeforserv	-32.150	-220.619	39.899	-17.096	-185.505	-132.031
	(-0.38)	(-0.43)	(0.31)	(-0.10)	(-0.52)	(-0.46)
tradfee	10.767***	11.573***	5.719***	4.613***	-20.876	-12.780
	(3.00)	(3.26)	(3.82)	(3.26)	(-0.39)	(-0.26)
ni	-116.052	-147.591	-46.468**	-49.691***	44.994***	39.511**
	(-1.34)	(-1.53)	(-2.34)	(-2.71)	(2.61)	(2.32)
RER14	-3.471	-0.115	-2.818	-1.521	-2.497	-2.843
	(-0.60)	(-0.02)	(-0.71)	(-0.39)	(-0.54)	(-0.59)
remul	18.791**	20.244**	13.159***	13.448***	12.312***	11.928***
	(2.04)	(2.31)	(2.68)	(3.15)	(3.70)	(3.53)
recon	15.727***	19.128**	13.468***	14.397***	15.559***	16.499***
	(2.97)	(2.51)	(4.84)	(5.30)	(6.20)	(6.21)
recom	2.184	2.713	2.541	2.382	2.890	3.271
	(0.65)	(0.73)	(0.92)	(0.93)	(1.00)	(1.09)

ci	4.434	0.848	2.325	2.520	3.310	2.643
	(0.67)	(0.13)	(0.68)	(0.84)	(0.95)	(0.75)
cons	-1.221	-7.006	-0.942	-2.199	-4.107	-3.694
	(-0.08)	(-0.21)	(-0.16)	(-0.29)	(-1.06)	(-0.98)
Roa	-60.110***	-63.106***	-8.247	-8.692	-7.905	-8.852
	(-3.14)	(-3.16)	(-0.86)	(-1.04)	(-0.93)	(-1.08)
Effic	0.024	0.100	0.087	0.086	0.026	0.008
	(0.31)	(1.53)	(1.43)	(1.42)	(0.15)	(0.05)
Nonperforming	46.987***	50.017***	22.378**	22.481***	0.625	-0.842
	(4.51)	(5.15)	(2.42)	(2.70)	(0.07)	(-0.10)
Llr	-43.135	-18.896	28.169	23.006	27.957	27.141
	(-0.63)	(-0.44)	(0.73)	(0.72)	(1.16)	(1.36)
Sec	2.019	3.062	-0.371	0.689	4.060	4.181
	(0.56)	(0.67)	(-0.10)	(0.21)	(1.27)	(1.30)
Coredeposits	-1.036	0.039	-1.083	-1.332	-1.165	-1.476
	(-0.43)	(0.02)	(-0.91)	(-1.18)	(-0.77)	(-1.01)
Brokereddeposits	2.149	5.598	5.787***	5.780***	5.367***	5.597***
	(0.63)	(1.59)	(3.00)	(3.27)	(4.35)	(4.76)
Goodwill	-114.387	-87.661	-17.689	-20.915	-2.332	-3.645
	(-1.15)	(-1.02)	(-0.99)	(-1.16)	(-0.22)	(-0.34)
Ue	0.389**	0.428**	0.082	0.112	0.012	0.058
	(2.08)	(2.19)	(0.71)	(1.01)	(0.13)	(0.63)
pct_chng	15.366	22.561	-16.687*	-15.439*	-15.180*	-15.226*
	(0.83)	(0.70)	(-1.93)	(-1.83)	(-1.87)	(-1.86)
Pigrowth	0.087	0.133	-0.376***	-0.355***	-0.002	-0.013
	(0.37)	(0.43)	(-2.89)	(-2.95)	(-0.01)	(-0.08)
Constant	-8.946***	-9.960**	-6.099**	-6.746***	-9.890***	-9.967***
	(-2.62)	(-2.40)	(-2.43)	(-2.76)	(-4.83)	(-4.72)
Pseudo R2	0.7937	0.8192	0.6192	0.5942	0.4727	0.4758
number of failed banks	31	31	49	49	46	46
number of banks/clusters	518	516	531	530	531	529
Observations	18,872	18,841	18,886	18,856	18,885	18,853

Table 6. Demand Shock versus Informational Advantage

This table reports estimation of the logit probability regression of one-quarter-ahead, four-quarter-ahead and seven-quarter-ahead bank failure on institutional ownership variables and other control variables. In each column, each institutional ownership level is decomposed into two components: lagged level (lag1prop, lag1prop5, and lag1prop_ded, lag1prop_qix and lag1prop_tra) and a change in the level (Δprop, Δprop5, Δprop_ded, Δprop_qix, and Δprop_tra). Other variables are defined in Table 1. Columns (1-3), (4-6), and (7-9) are based on the information from one quarter, four quarters and seven quarters before bank failure respectively. T-statistics are below coefficients and shown in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

Table 6: Demand Shock versus Informational Advantage

VARIABLES	One quarter ahead			Four quarters ahead			Seven quarters ahead		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
lag1prop	-0.130***			-0.090***			-0.032**		
	(-3.51)			(-2.66)			(-2.38)		
Δprop	-0.004			-0.094***			-0.023		
	(-0.07)			(-3.27)			(-0.87)		
lag1prop5		-0.296***			-0.158***			-0.059*	
		(-3.36)			(-3.55)			(-1.81)	
Δprop5		-0.300***			-0.172***			-0.086*	
		(-3.58)			(-3.97)			(-1.88)	
lag1prop_ded			-0.346			-0.155*			-0.174*
			(-1.58)			(0.0819)			(-1.85)
Δprop_ded			-0.319			-0.149*			-0.095
			(-1.31)			(0.0863)			(-0.96)
lag1prop_qix			-0.125***			-0.102***			-0.050**
			(-2.83)			(0.0377)			(-2.37)
Δprop_qix			0.057			-0.119***			-0.057*
			(0.82)			(0.0393)			(-1.71)
lag1prop_tra			-0.188***			-0.0344			0.038
			(-2.90)			(0.0653)			(1.36)
Δprop_tra			-0.047			-0.0379			-0.003
			(-1.03)			(0.0533)			(-0.14)
stakeholder	251.917	246.447	277.742	-123.015	-145.809	-149.9	-46.277	-70.804	-22.942
	(1.00)	(1.09)	(1.25)	(-0.45)	(-0.40)	(324.6)	(-0.16)	(-0.23)	(-0.08)
feeforserv	-293.001	-486.629	-195.502	112.232	52.147	120.0	-200.788	-133.276	-212.481
	(-0.29)	(-0.52)	(-0.27)	(1.48)	(0.46)	(83.32)	(-0.60)	(-0.53)	(-0.58)
tradfee	14.128***	11.937***	18.436***	6.536***	4.793***	6.717***	-10.884	-3.943	-6.752
	(3.73)	(3.36)	(3.11)	(3.62)	(3.35)	(2.021)	(-0.23)	(-0.11)	(-0.14)
ni	-174.203*	-164.266*	-196.357*	-47.762**	-50.825***	-50.45**	44.001***	39.419**	42.303**
	(-1.92)	(-1.68)	(-1.92)	(-2.52)	(-2.68)	(20.40)	(2.60)	(2.42)	(2.22)
RER14	-4.938	-0.628	-1.775	-2.231	-1.068	-2.108	-1.841	-2.472	-1.859

	(-0.81)	(-0.10)	(-0.25)	(-0.50)	(-0.25)	(4.424)	(-0.41)	(-0.53)	(-0.43)
remul	21.508***	23.568***	27.217***	15.855***	14.801***	15.56***	13.456***	13.044***	13.932***
	(3.37)	(3.14)	(3.17)	(3.35)	(3.82)	(5.058)	(4.21)	(4.05)	(4.22)
recon	16.564***	18.165***	18.842**	13.920***	14.686***	13.63***	16.028***	16.922***	14.883***
	(2.60)	(2.72)	(2.36)	(4.39)	(4.63)	(3.299)	(6.22)	(6.26)	(5.47)
recom	1.782	2.212	3.163	2.178	2.460	2.403	3.053	3.362	3.135
	(0.59)	(0.71)	(0.87)	(0.68)	(0.81)	(3.275)	(1.16)	(1.23)	(1.21)
ci	7.544*	5.018	7.851	2.929	2.072	2.874	4.668	4.012	4.035
	(1.68)	(1.06)	(1.62)	(0.91)	(0.66)	(3.270)	(1.58)	(1.40)	(1.33)
cons	-0.482	1.317	-0.984	1.370	1.542	1.550	-2.745	-2.596	-2.422
	(-0.06)	(0.18)	(-0.12)	(0.32)	(0.36)	(4.442)	(-0.78)	(-0.79)	(-0.60)
roa	-58.875***	-68.512***	-65.461***	-10.471	-9.079	-10.90	-9.601	-9.959	-9.872
	(-3.41)	(-3.25)	(-3.47)	(-1.20)	(-1.03)	(9.162)	(-1.18)	(-1.28)	(-0.98)
effic	0.042	0.094	0.036	0.081	0.093	0.0647	-0.013	-0.023	0.040
	(0.77)	(1.22)	(0.68)	(0.73)	(0.85)	(0.106)	(-0.08)	(-0.16)	(0.16)
nonperforming	43.376***	47.722***	42.087***	21.236**	22.625***	21.70**	-0.391	-1.721	1.336
	(3.87)	(4.82)	(3.99)	(2.50)	(2.69)	(9.189)	(-0.04)	(-0.21)	(0.15)
llr	-30.940	-32.366	-39.121	13.488	15.664	11.14	23.462	25.235	21.104
	(-0.75)	(-0.84)	(-0.96)	(0.39)	(0.49)	(37.74)	(1.06)	(1.34)	(0.76)
sec	2.459	4.806	3.724	2.805	2.871	2.584	4.554	4.717	3.680
	(0.62)	(0.98)	(0.73)	(0.80)	(0.86)	(3.412)	(1.49)	(1.59)	(1.21)
coredeposits	-0.207	0.661	0.257	-1.403	-1.244	-1.306	-1.312	-1.528	-1.039
	(-0.09)	(0.22)	(0.11)	(-0.96)	(-0.83)	(1.471)	(-0.95)	(-1.14)	(-0.67)
brokereddeposits	2.901	4.690	2.511	6.468***	6.416***	6.362***	5.721***	5.800***	5.847***
	(0.84)	(1.34)	(0.70)	(3.24)	(3.88)	(2.080)	(4.89)	(5.15)	(4.18)
goodwill	-116.356	-98.481	-109.298	-10.062	-14.705	-12.54	-1.526	-2.805	-3.777
	(-1.26)	(-1.20)	(-1.24)	(-0.64)	(-0.86)	(16.67)	(-0.14)	(-0.27)	(-0.34)
ue	0.454**	0.440**	0.535**	0.142	0.158	0.125	0.016	0.057	-0.061
	(2.33)	(2.54)	(2.26)	(1.22)	(1.36)	(0.122)	(0.17)	(0.62)	(-0.57)
pct_chng	22.067	23.761	18.067	-15.722*	-17.728**	-17.38**	-14.167*	-14.592*	-18.718*
	(1.10)	(1.05)	(0.95)	(-1.82)	(-1.98)	(8.442)	(-1.74)	(-1.86)	(-1.96)
pigrowth	0.116	0.136	0.087	-0.367***	-0.386***	-0.374***	0.012	0.005	0.007
	(0.49)	(0.51)	(0.37)	(-3.20)	(-3.17)	(0.118)	(0.08)	(0.03)	(0.05)
Constant	-10.067***	-11.339**	-12.034**	-8.030***	-8.298***	-7.838***	-10.217***	-10.490***	-9.390***
	(-2.60)	(-2.54)	(-2.27)	(-2.89)	(-2.92)	(2.838)	(-4.46)	(-4.52)	(-3.99)
Pseudo R2	0.7973	0.8078	0.8062	0.6053	0.5997	0.6108	0.4678	0.4706	0.493
number of failed banks	31	30	31	45	45	45	46	44	46
number of banks/clusters	495	491	495	507	504	507	508	504	508
Observations	17,686	17,635	17,685	17,698	17,648	17,697	17,699	17,647	17,698

Table 7. Bank Failure and Institutional Ownership, Conditional on Bank Financial Distress

This table presents the estimation results of the logit regression model of bank failure probability conditional on bank financial distress. A bank is defined as financially distressed when its sum of equity plus loan loss reserves is less than half of the value of its nonperforming assets (NPA): (Equity+Reserves-0.5*NPA) <0, where NPA equals the sum of loans past due 30-89 days and still accruing interest, loans past due 90+ days and still accruing interest, nonaccrual loans, and foreclosed real estate. The financially distress dummy (FD dummy) equals one for distressed banks, and zero otherwise. The interaction terms between financially distressed dummy and shareholding proportion of dedicated, quasi-indexer and transient investors are FD dummy*prop_ded, FD dummy*prop_qix, and FD dummy*prop_tra. Other variables are defined in Table 1. Columns (1-5) are based on the information from one to five quarters before bank failure, respectively. T-statistics are below coefficients and shown in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

Table 7: Bank Failure and Institutional Ownership, Conditional on Bank Financial Distress

VARIABLES	lag1	lag2	lag3	lag4	lag5
	(1)	(2)	(3)	(4)	(5)
Financial distress dummy	2.453**	1.251	2.324**	3.415***	2.464**
	(2.15)	(0.95)	(2.04)	(3.18)	(2.25)
prop_ded	-0.182	0.009	-0.023	-0.045	-0.181
	(-1.38)	(0.24)	(-0.38)	(-0.60)	(-1.58)
FD dummy*prop_ded	-19.123	-0.169*	-0.769***	-0.454***	0.016
	(-0.55)	(-1.90)	(-2.91)	(-2.93)	(0.09)
prop_qix	-0.122	-0.204***	-0.156***	-0.100***	-0.097***
	(-1.47)	(-3.64)	(-3.49)	(-3.04)	(-2.99)
FD dummy*prop_qix	0.053	0.187**	0.143***	0.023	0.062
	(0.63)	(2.52)	(2.63)	(0.49)	(1.46)
prop_tra	-0.257	-0.189	0.033	-0.047	0.020
	(-1.39)	(-1.07)	(1.61)	(-0.79)	(0.80)
FD dummy*prop_tra	0.228	-0.095	-0.191**	-0.012	-0.063
	(1.26)	(-0.43)	(-2.49)	(-0.14)	(-0.91)
stakeholder	352.456	109.454	-34.201	-504.460	-17.668
	(1.02)	(0.20)	(-0.08)	(-0.77)	(-0.08)
feeforserv	-290.445	-182.839	104.113**	54.144	47.809
	(-0.48)	(-0.51)	(2.26)	(1.00)	(0.33)
tradfee	13.689***	12.688***	8.655***	6.275***	5.701**
	(5.03)	(4.32)	(5.12)	(3.38)	(2.36)
ni	-106.967	-78.877**	-17.684	-42.565**	-39.798*
	(-0.91)	(-2.24)	(-0.89)	(-2.40)	(-1.89)
RER14	-1.964	-5.920	-2.631	0.199	1.150
	(-0.23)	(-0.88)	(-0.58)	(0.04)	(0.25)
remul	24.524***	24.501***	18.971***	19.001***	20.434***

	(2.81)	(4.32)	(4.23)	(3.80)	(4.96)
recon	20.025***	20.622***	14.897***	15.576***	15.002***
	(2.79)	(4.49)	(4.29)	(5.20)	(5.58)
recom	1.768	-2.791	-1.657	3.261	3.446
	(0.68)	(-0.82)	(-0.49)	(1.08)	(1.20)
ci	6.715	10.363***	7.655***	7.269**	6.547**
	(1.64)	(2.75)	(2.69)	(2.22)	(2.08)
cons	-23.552	-41.805	-43.396	-9.726	-0.047
	(-0.61)	(-0.92)	(-1.29)	(-0.38)	(-0.01)
roa	-29.587**	-43.438***	-21.060***	5.223	-1.239
	(-2.26)	(-3.57)	(-2.96)	(0.51)	(-0.13)
effic	0.070*	0.051	0.103**	0.130**	0.160***
	(1.67)	(0.86)	(2.34)	(2.02)	(3.98)
nonperforming	31.912***	23.005*	16.268*	11.038	9.413
	(2.64)	(1.79)	(1.89)	(1.50)	(1.25)
llr	-1.973	56.958	65.181**	65.331**	46.035*
	(-0.04)	(1.31)	(1.98)	(2.30)	(1.67)
sec	7.306	4.532	4.138	4.822	5.364**
	(1.31)	(1.01)	(1.12)	(1.29)	(1.98)
coredeposits	1.348	1.237	1.530	0.238	0.172
	(0.46)	(0.33)	(0.70)	(0.13)	(0.10)
brokereddeposits	-1.966	3.369	4.570**	6.710***	6.476***
	(-0.48)	(1.18)	(2.28)	(3.47)	(3.85)
goodwill	-134.250	-73.942	-69.790	-9.144	-11.955
	(-1.18)	(-1.50)	(-1.62)	(-0.62)	(-1.01)
ue	0.428*	0.311**	0.120	-0.011	0.049
	(1.95)	(2.34)	(1.21)	(-0.10)	(0.52)
pct_chng	-2.097	9.580	-23.204**	-13.538	-27.939***
	(-0.12)	(0.75)	(-2.19)	(-1.57)	(-4.00)
pigrowth	-0.066	-0.250***	-0.205	-0.355***	0.101
	(-0.27)	(-2.61)	(-1.49)	(-2.98)	(0.61)
Constant	-13.009**	-11.597***	-11.149***	-10.761***	-11.526***
	(-2.32)	(-2.85)	(-3.55)	(-3.42)	(-4.50)
Pseudo R2	0.8221	0.7828	0.728	0.6606	0.6263
number of failed banks	31	41	50	49	47
number of banks/clusters	518	526	532	531	533
Observations	18,871	18,879	18,886	18,885	18,886

Table 8. Quarterly Institutional Ownership Characteristics Comparison between Banks Filed for Chapter 7 and Banks Acquired

This table compares institutional ownership characteristics including aggregated shareholding proportion (Prop), Shareholding proportion of dedicated investors, number of institutions (# of investors), non-zero-points and maintain-stake-points durations between banks filed for chapter 7 (Ch7 =1) and banks acquired (Ch7 = 0) over nine quarters including the filing quarter and previous 8 quarters. For each institutional ownership variable category, the first and second row show the variable mean for firms emerged and liquidated at filing quarter or a quarter before fling quarter, respectively. The third and fourth row report the mean and t-statistics for the difference between the first and second row. The last two rows of the table show the number of observations for each quarter over the nine quarters. t-statistics are shown in parenthesis. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

	Time	Filing Quarter	Filing Quarter-1	Filing Quarter-2	Filing Quarter-3	Filing Quarter-4	Filing Quarter-5	Filing Quarter-6	Filing Quarter-7	Filing Quarter-8
Prop (%)	Ch7 = 0	4.8723	12.2750	14.1909	16.1319	20.5111	19.8234	21.6856	22.0900	23.0682
	Ch7 = 1	5.4894	17.6419	12.5783	18.1726	23.4182	24.3812	21.1097	23.5758	21.7525
	0-1	-0.6171	-5.3669	1.6127	-0.0407	-2.9071	-4.5578	0.5758	-1.4858	1.3157
	t-value	-0.15	-0.89	0.37	-0.35	-0.33	-0.53	0.09	-0.22	0.19
Prop of Dedicated Investors (%)	Ch7 = 0	0.3188	1.0520	1.4811	1.3608	1.6390	2.0987	2.1153	1.9025	1.9424
	Ch7 = 1	0	0.4034	0.00463	0.3449	1.4785	1.6636	0.9504	1.4172	1.6349
	0-1	0.3188	0.6486	1.4765	1.0159	0.1605	0.4351	1.1648	0.4853	0.3075
	t-value	1.41	1.04	1.99*	1.71*	0.16	0.35	1.47	0.41	0.31
# of investors	Ch7 =0	12.6774	38.9730	30.2895	32.2619	31.3182	34.4318	43.8444	39.3810	32.9767
	Ch7 =1	18.5455	39.5385	34.3077	33.0769	35.6923	38.4167	38.9167	31.0833	30.0833
	0-1	-5.8680	-0.5655	-4.0182	-0.8150	-4.3741	-3.9848	4.9278	8.2976	2.8934
	t-value	-0.71	-0.04	-0.37	-0.07	-0.31	-0.27	0.42	0.83	0.21
Non-zero-points	Ch7 =0	14.2022	14.0493	14.4619	13.4579	13.8216	13.9631	13.7034	13.9426	13.8454
	Ch7 =1	9.4287	9.0804	8.7630	8.5010	8.7787	9.5496	9.2222	8.9026	8.7741
	0-1	4.7735	4.9689	5.6990	4.9569	5.0429	4.4134	4.4812	5.0400	5.0714
	t-value	1.61	1.44	1.97*	1.85*	1.79*	1.20	1.32	1.83*	1.30
Maintain-stake-points	Ch7 =0	12.7764	12.6052	12.9766	12.0073	12.3245	12.5175	12.3027	12.6012	12.4908
	Ch7 =1	7.9352	7.5691	7.2432	6.9748	7.3203	8.1581	7.9203	7.6873	7.6277
	0-1	4.8412	5.0360	5.7334	5.0325	5.0041	4.3594	4.3825	4.9139	4.8631
	t-value	1.65*	1.46	2.01*	1.92*	1.81*	1.19	1.30	1.86*	1.26
# obs	Ch7 =0	43	43	43	44	45	46	47	45	45
	Ch7 =1	13	13	13	13	13	12	12	12	12

Table 9: Propensity Score Matching Analysis

This table displays the average treatment effect on treated (ATET) for bank failure. Outcome is bank failure. The treatment effect is High Institutional Ownership. The matched sample is constructed using nearest-neighbor score matching with scores given by a probit model in which the dependent variable is a dummy variable that equals one if a firm has an institutional ownership variable above the yearly median. Column (1), (2), and (3) show the effects of high institutional ownership proportion, high ownership proportion of the largest 5 institutional investors, and high shareholding proportion of the dedicated institutional investors, respectively. The propensity score is estimated using all the control variables used in the primary regression. The four nearest neighbors matching uses Abadie and Imbens (2006) standard errors and the caliper is 0.05. Standard errors are shown below the treatment effect. *, **, and *** indicates statistical significance at the 10%, 5% and 1% level, respectively.

Average Treatment Effect on Treated (ATET) Four Nearest neighbors matching High Institutional Ownership vs. Low Institutional Ownership Observations			
	Prop	Prop5	Prop_ded
	(1)	(2)	(3)
One quarter ahead	-.0020655	-.0019581***	-.0050778
	.0015316	.0005794	.0034131
Two quarters ahead	-.0042329	-.0019571***	-.0028016*
	.0026597	.0005063	.0014497
Three quarters ahead	-.0024616	-.001297*	-.0036978**
	.0017434	.0006896	.0015894
Four quarters ahead	-.0065915	-.0015352**	-.0029847
	.0051487	.0006267	.0024613
Five quarters ahead	-.0060356	-.0030168	-.0034598
	.0050736	.002696	.0030915
Six quarters ahead	-.0011126	-.0003175	-.0022461***
	.0006927	-0.54	.0007862
Seven quarters ahead	-.0006622	-.0004235	-.0027751***
	.000645	.0006012	.0007076
Eight quarters ahead	-.001404*	-.0008731	-.0015587**
	.0008262	.0007663	.0006344
Nine quarters ahead	-.0007947	.0000529	-.001559**
	.0009406	.0006548	.0007496

Appendix 1: Bank Closing Summary:2001-2019

https://www.fdic.gov/bank/historical/bank/

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Bank	4	11	3	4	0	0	3	25	140	157
Total Assets (Millions)	2,358.60	2,705.40	1045.2	163.1	0	0	2,602.50	373,588.78	170,867.00	96,514.00
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Bank	92	51	24	18	8	5	8	0	0	
Total Assets (Millions)	36,012.20	12,055.80	6,101.70	3,088.40	6,727.50	278.8	6,530.70	0	0	

Appendix 1. Failed Bank List in the Sample

This table lists the information of the 55 failed banks in our sample. In the column of Type, "bank" indicates that the institutional ownership variable is linked to the failed bank itself. "head" means institutional ownership variables is linked to the head office of the failed bank. Permco is CRSP PERMCO identifier which is a unique and permanent company identification number assigned to publicly-traded institutions in the CRSP database. RSSD9001 is the primary identifier on the Federal Reserve Bank database. It is a unique one-up number (with a check digit) that is assigned by the RSSD software when an entity is first added to the database. This identifier has no inherent attribute information, never changes, and is never reused. RSSD9348 is the five-digit code assigned to the principle holding company or the highest holding company in a tiered organization.

Type	Closing_Date	Bank_Name	permco	RSSD9001	RSSD9348
bank	10-Apr-09	Cape Fear Bank	44492	2706016	3362594
bank	16-Apr-10	City Bank	16572	456474	0
head	11-Jan-02	Hamilton Bank, NA	35264	985732	1249990
head	29-Aug-08	Integrity Bank	51206	2922339	2924360
head	5-Sep-08	Silver State Bank	52552	2479310	2777614
head	6-Feb-09	County Bank	14291	191663	2332750
head	27-Mar-09	Omni National Bank	51207	293026	2868071
head	24-Apr-09	First Bank of Beverly Hills	15247	402172	3312227
head	8-May-09	Westsound Bank	51567	2791003	3350005
head	17-Jul-09	Vineyard Bank	41821	807665	1364110
head	17-Jul-09	Temecula Valley Bank	47027	2522681	3102585
head	24-Jul-09	Security Bank of Jones County	15864	622831	2244358
head	24-Jul-09	Security Bank of Houston County	15864	708137	2244358
head	24-Jul-09	Security Bank of Bibb County	15864	1221558	2244358
head	24-Jul-09	Security Bank of North Metro	15864	3115129	2244358
head	24-Jul-09	Security Bank of North Fulton	15864	3150474	2244358
head	24-Jul-09	Security Bank of Gwinnett County	15864	3172038	2244358
head	7-Aug-09	First State Bank	46002	1219591	2621267
head	14-Aug-09	Colonial Bank	4128	570231	1080465
head	14-Aug-09	Community Bank of Nevada	45997	2319676	3124381
head	14-Aug-09	Community Bank of Arizona	45997	3223800	3124381
head	21-Aug-09	CapitalSouth Bank	49992	567231	1925968
head	11-Sep-09	Corus Bank, N.A.	2343	259031	1200393
head	18-Sep-09	Irwin Union Bank and Trust Company	7502	130943	1199732
head	6-Nov-09	United Commercial Bank	16308	43173	2694814
head	18-Dec-09	Imperial Capital Bank	14074	1349890	3114654
head	8-Jan-10	Horizon Bank	8472	508878	2343662
head	22-Jan-10	Columbia River Bank	16311	644178	2378440
head	29-Jan-10	First Regional Bank	2026	974866	1029428
head	29-Jan-10	First National Bank of Georgia	42654	147839	1134911
head	26-Feb-10	Rainier Pacific Bank	44503	129394	3201518
head	5-Mar-10	Sun American Bank	45181	1160732	2526764

head	19-Mar-10	Appalachian Community Bank	47875	2280552	2468293
head	9-Apr-10	Beach First National Bank	46845	2391252	2391243
head	16-Apr-10	Tamalpais Bank	45481	1890598	3836442
head	23-Apr-10	Amcore Bank, National Association	8224	938840	1208661
head	30-Apr-10	Westernbank Puerto Rico	7427	752970	2801546
head	30-Apr-10	R-G Premier Bank of Puerto Rico	14925	559777	2452180
head	30-Apr-10	Frontier Bank	16053	150071	1031346
head	30-Apr-10	Eurobank	45482	1164730	3106864
head	14-May-10	Midwest Bank and Trust Company	15982	968436	1209828
head	28-May-10	Bank of Florida - Southwest	43781	2796615	2796624
head	28-May-10	Bank of Florida - Southeast	43781	3116274	2796624
head	28-May-10	Bank of Florida - Tampa	43781	3287325	2796624
head	18-Jun-10	Nevada Security Bank	45001	3077629	3192997
head	9-Jul-10	Bay National Bank	50724	2887661	2887652
head	16-Jul-10	First National Bank of the South	48772	2859574	2859565
head	20-Aug-10	Pacific State Bank	47022	1158832	3109605
head	28-Jan-11	First Community Bank	12531	236751	1364071
head	15-Apr-11	Nexity Bank	47444	509231	2836883
head	29-Apr-11	The Park Avenue Bank	31694	104038	1083934
head	20-May-11	Atlantic Southern Bank	52130	3075278	3264812
head	15-Jul-11	First Peoples Bank	47016	2803223	3049671
head	29-Jul-11	Integra Bank National Association	11264	23241	1132654
head	23-Sep-11	Bank of the Commonwealth	40986	821120	1250606