ISSN 1936-5330

THE FEDERAL RESERVE BANK *of* KANSAS CITY
RESEARCH WORKING PAPERS

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November 2016
RWP 16-13
https://dx.doi.org/10.18651/RWP2016-13

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Sectoral Loan Concentration and Bank Performance (2001-2014)

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First draft: November 2016

Sectoral loan concentration is an important factor in bank performance. We develop a measure of sectoral loan concentration and study how community bank performance and the size-performance relationship vary with loan concentration and *changes* in loan concentration. The size-profitability relationship varies with concentration in the residential real-estate (RRE) sector. Higher RRE concentration is associated with lower returns especially for larger community banks—banks with assets totaling a billion or more. Concentration in other sectors, such as agriculture and commercial real estate (CRE), is significantly associated with risk of bank failure or acquisition. Results for changes in concentration appear to be driven by the boom in CRE. Large positive (negative) changes in CRE concentration are both preceded and followed by large increases (decreases) in overall returns. Banks that switch specializations increase the hazard of failure but decrease the odds of being acquired.

JEL Codes: G21, G33, G34

Keywords: commercial banks, loan concentration, bank failure, acquisitions

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1. Introduction

How do we measure loan concentration of banks in different sectors? How does loan concentration or *changes* in loan concentration in a particular sector affect bank performance? Sectoral loan concentration has been an important factor in policy and research discussions since the recent financial crisis. Excessive loan concentration has the potential for greater earnings volatility and, in extreme cases, adverse consequences that threaten a financial institution's health or ability to maintain its core operations (Friend et al., 2013). In spite of these critical relationships between sectoral loan concentration and bank performance, the literature in this area is relatively sparse.[1]

We begin by developing a simple measure of sectoral loan concentration. A common practice of determining bank loan concentration uses ad hoc cutoffs on loan shares in a particular sector.[2] While loan shares can determine a bank's specialization in a given sector, they do not provide a measure of the degree of specialization or loan concentration within the bank. Indeed, to determine the loan concentration among the various sectors within a bank we need not just a measure of its share in a given sector, but also the *distribution* of loan shares across sectors. Therefore, as a first step, we examine the distribution of loan shares in each sector and measure the bank-level concentration of loans among all sectors.[3,4] The bank-level concentration measure is then multiplied by the corresponding loan share to create a sectoral loan concentration measure (LCM). Our approach to developing the LCM is heuristic and it yields a continuous measure on an annual basis.

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[1] See Basset and Marsh (2016) and references therein for an overview on studies related to CRE concentration.
[2] For example, community banks with agricultural loans more than 20 percent of assets are deemed to have a lending specialization in agriculture. See, for example, https://www.fdic.gov/regulations/resources/cbi/data/public_cb_ReadMe.html
[3] The bank-level concentration measure considered here is a simple Herfindahl-Hirschman index (HHI) using annual data on bank loan shares.
[4] As explained below in Section 3, these distributions call into question the use of ad hoc cutoffs that is common practice in measuring loan concentration.

Using this measure, we examine how bank performance varies with sectoral loan concentration and changes in loan concentration after controlling for a variety of other related factors. An important factor associated with bank performance is bank size. A large and prominent body of work explores the relationship between size and profitability (a commonly used measure of bank performance).[5] The size-profitability relationship is also influenced by the sectors in which the banks operate. Sectoral differences in returns as well as economies of scale can determine how bank performance is related to size. Some sectors may require banks to grow larger in order to maximize returns while the business model in other sectors may be more amenable to a smaller scale of operations. As a result, sectoral differences in loan concentration can influence the effect of size on performance. While there have been studies exploring the size-profitability relationship, there has been little exploration as to how credit concentration might influence bank profitability and its relation to size. We attempt to fill that gap by exploring how bank performance, in general, and the size-performance relationship, in particular, relate to both the level and the change in loan concentration.

We explore how the size-profitability relationship can vary with loan concentration using bank level data on U.S. community banks from 2001 to 2014. Due to their small size, community banks tend to be less diversified than larger banks and typically focus their lending efforts in a few sectors. As a result, the community bank universe involves banks of different sizes with a variety of loan concentrations in different sectors. Moreover, smaller community banks are more likely than larger banks to change their loan concentrations over time. This enables us to account for unobserved heterogeneity at the bank level in studying the associations mentioned above. Call Report data for community banks allows us to measure concentration in five sectors: agriculture (AGR), consumer (CON), commercial and industrial (CNI), commercial real estate

[5] See Huges and Mester (2008) and Mester (2008) for a survey of this literature.

(CRE) and residential real estate (RRE). Consequently, each bank has five yearly measures of LCMs, one for each sector.

Sectoral loan concentration can also affect broader indicators of bank performance such as survival and failure or acquisition. We distinguish between acquisitions of banks that are performing poorly, and therefore are likely fire sale acquisitions, from all other acquisitions. Accordingly, we study three categories of bank disappearance: failures, fire sales, and acquisitions and how each end-of-life event is influenced by sectoral loan concentration or changes in loan concentration.

As a first step, we re-examine the size-profitability relationship during 2001-14 that was estimated in Regehr and Sengupta (2016). In estimating how profitability varies with size, we control for a wide-range of bank-specific and market-specific factors that also affect profitability. In addition to the large set of controls included in Regehr and Sengupta (2016), we also include the LCMs for each of the five sectors. Using a sample of community banks with less than $10 billion (real 2014 US dollars) in assets, our model of size and profitability predicts how returns vary with size conditional on all other factors that affect profitability. Our results show that profitability is increasing in size but at a diminishing rate. As a result, conditional returns are a concave function of size. The predicted returns (conditional on other factors held at the mean values) are maximized at a bank size of around $2 billion (in real 2014 dollars). We also show that while the relationship was disrupted during the crisis, it remains fairly stable during the non-crisis years, namely the pre-crisis expansion during 2001-2006 and the post-crisis recovery during 2010-2014.

The results show that the size profitability relationship does vary with bank RRE concentration. Higher RRE concentration is associated with lower returns especially for larger

banks—banks around a billion or more in asset size. However, the size profitability relationship does not vary significantly with loan concentration in other sectors. Nevertheless, loan concentration in other sectors does affect the risk of bank failure or acquisition. In particular, higher CRE concentration increases the risk of bank failure, fire sales, and acquisitions thereby lowering the odds of survival. Conversely, higher CON concentration reduces the risk of bank failure whereas higher AGR concentration reduces the risk of a fire sale. Lastly, higher CNI concentration increases the likelihood of being acquired. This result suggests that acquirers are more likely to target those banks that have built up expertize in lending to small businesses.

We also study how bank performance varies with changes in the LCMs. Given that the LCMs vary annually, we distinguish between two types of changes in the LCM. The first type of change involves "large jumps" in our LCM measure (at least greater than two standard deviations) within 1-2 years. The second type of change involves a "switch" in specialization for banks that change their loan concentration from one sector to another. This type of change is determined by ranking sectors within the bank using the LCM. It allows us to determine how rapid switches in loan concentration from one sector to another affect bank performance.

We find that, during the sample period (2001-2014), the effects of changes in concentration are largely driven by the boom-bust cycle in CRE lending. Large increases in CRE concentration are associated with significant increases in overall returns in the preceding years and significant increases in returns in the years following the change. The converse is true for large decreases in CRE concentration: significant decreases in returns associated with large declines in CRE LCMs in the preceding and following 1-2 years. The results are suggestive of herding behavior by banks during the 2000s boom-bust cycle in CRE. They also lend support to similar evidence on high concentration CRE banks outperforming their lower concentration

peers (Lopez, 2009; Pana, 2010). Importantly, we did not find similar evidence of large changes in returns associated with large jumps in concentration for the other 4 sectors. It is also important to emphasize that the change in returns observed here is aggregated over all sectors for the bank—data on sectoral returns is not available. Still, the significantly large changes in returns preceding and following large changes in CRE points to strong selection effects in concentration choice and changes in concentration. Therefore, the results in this paper are predictive and not causal.

A final result here relates to banks that switches specialization. We define a bank that switches concentration as a bank where the sector ranked third, fourth, or fifth in terms of the LCM switches to being the top ranked sector within 3 years. Our estimation results show that banks that switch specializations increase the risk of failure but lower the risk of acquisitions in fire sales or otherwise. This result suggests that acquirers in the industry tend to avoid banks that switch specializations, even at fire sale prices.

Section 2 presents a brief review of the literature that is related to this paper. The data and the development of the LCMs are explained in Section 3. Section 4 first derives the size-profitability relationship and then estimates how this relationship varies with the LCMs. Section 5 describes how bank failures, fire-sales and acquisitions vary with LCMs. Section 6 examines how returns change with changes in LCM and section 7 studies how switching loan concentrations can affect the risk of bank survival. Section 8 concludes.

2. Literature Review

The first strand of literature that this paper relates to includes studies on sector concentration. Studies on loan concentration in bank portfolios have gained importance from a

risk perspective (Gordy, 2003; Gordy and Lutkebohmert, 2006; Duellman and Masschelein, 2006). Sector concentration risk arises when a bank's portfolio is unbalanced in exposures to certain sectors which enhance the risk of bank failures (see BCBS, 2006 for a survey and references therein). This paper presents a new measure of loan concentration, namely the LCM, and assesses how bank performance (broadly defined here to include survival and failure) varies with the LCM. Unlike the model-based approaches in this literature, which require a significant level of granularity in the data for implementation, ours is a more heuristic approach tailored largely to the data available in U.S. Call Reports.

The paper also contributes to a second strand of literature on bank size and profitability. A large body of work contributes to this literature on issues related to bank size, productivity, and economies of scale (Huges and Mester, 2008; Mester, 2008). Prior analysis has examined how technological and competitive changes in the banking industry impacted bank performance in the late 1990s and early 2000s. For example, Berger and Mester (2003) use structural approaches to estimate bank cost and profit functions. The financial crisis prompted a re-assessment of the size-profitability relationship for large banks and the too-big-to fail problem using non-parametric techniques (Wheelock and Wilson, 2009; 2012) as well as for smaller community and regional banks using simpler reduced-form estimation (Regehr and Sengupta, 2016). However, to the best of our knowledge, there is no study that examines how the size profitability relationship varies with loan concentration. Our results suggest that the size-profitability model is significantly different for banks with higher RRE concentration relative to other community banks—banks that are diversified or concentrated in other sectors (low RRE concentration).

This paper also belongs to a third strand of literature that examines bank lending behavior during our sample period, 2001-14. As mentioned earlier, the period of study was dominated by a boom-bust cycle in CRE lending that affected bank performance over this period (Friend et al., 2013). CRE loans began to account for larger share of bank loans in the early 2000s and that led to widespread bank failures during and after the financial crisis. Basset and Marsh (2016) examine how regulatory guidance on banks with higher CRE concentration affected loan growth in CRE and other sectors following this guidance. In a similar vein, De Young et al., (2015) examine CNI lending to test whether US banks rationed credit to small business in the aftermath of the financial crisis. Both studies examine how shocks "exogenous" to individual sectors affect loan growth in other sectors. In contrast, we examine how bank performance varies with concentration. While sector-specific exogeneity may satisfy the exclusion restriction for lending to other sectors (as illustrated in the studies mentioned above), it is difficult to satisfy the exclusion restriction in studies such as this one, where bank performance is the dependent variable. Consequently, our empirical exercise is limited to a predictive analysis and not a causal one.

The results in our study do find support in related studies on CRE lending for the same time period. For example, our results on CRE concentration find support in Friend et al., (2013) who also find that failures were significantly higher for banks with high CRE concentration. Moreover, Lopez (2007) and Pana (2010) find that banks with higher CRE concentration tended to have better performing CRE portfolios than their less concentrated peers. This is consistent with our results that large positive changes in CRE concentration during this period were preceded and followed by significant increases in returns.

3. Measuring Loan Concentration

This section describes the heuristic approach with which we develop our loan concentration measure. Our aim is to provide a simple measure of sectoral loan concentration that examines the degree of specialization in the particular sector for the given year. While loan shares can determine a bank's specialization in a given sector, they do not provide a measure of the degree of specialization or loan concentration within the bank. In other words, they cannot tell us the extent to which a bank focuses in one particular sector, for example CRE, relative to others. On the other hand, concentration measures, computed using the entire sectoral loan distribution within the bank such as HHI or the concentration ratio, are bank level measures and do not yield a measure of concentration for a particular sector. Therefore, we need a measure of sectoral loan concentration that allows us to compare loan concentrations of different banks on an annual basis.

We adopt a data-driven approach to developing the LCM. We use bank-level data on community banks during 2001-2014. The primary data sources are the FDIC's Summary of Deposits (SOD) and the FFIEC Call Report (031/041). The SOD data are as of second quarter (the FDIC conducts the survey annually at the end of the second quarter), while the Call Report data are as of fourth quarter to match annual bank profitability to the annual macroeconomic data available for the geographic regions. The regression data are an unbalanced panel of annual observations from 2001 to 2014. The sample excludes banks with real assets of $10 billion or more, de novo banks (defined as banks less than three years of age), and other nontraditional banks, such as credit card banks and banks that do not take deposits or make loans.

Most community banks in our sample focus their lending in one or two sectors—one of which is typically CRE or RRE. As a result, the distribution of bank loans as a share of total

assets for each sector tends to be right-skewed as shown in Figure 1. Details of each loan share distribution are also provided in Panel A of Table 2. At the 25th percentile of the distribution, loan shares in all sectors are less than 10 percent of assets. For some sectors such as AGR, CNI and CON loans shares are less than 10 percent even at the median of the distribution. Therefore, while the loan share distribution is right-skewed for all sectors, the skewness is significantly greater for AGR, CNI and CON than for CRE or RRE.

Next, we compute bank-level concentration measures using sectoral loan distribution within the bank. A commonly used measure of concentration is the Herfindahl-Hirschman Index (HHI). The HHI is typically used as measure of market or geographical concentration and is calculated as the sum of squared market shares (of loans or deposits) in a local banking market. We deploy this measure to determine sectoral loan concentration within a bank. Let s_{ij} be bank *i*'s share in sector *j* where *j* = AGR, CNI, CON, CRE and RRE, the 5 sectors for which the Call Report provides loan data. *Loan HHI* is the sum of squares of loan shares across different sectors within a bank

$$h_i = \sum_j s_{ij}^2$$

The distribution of Loan HHI and loan shares for each of the 5 sectors are plotted in Figure 2. Each point on the plots is a bank-year observation. Two features of the plots in Figure 2 deserve attention. First, the distribution of loan share and loan HHI plots is continuous. This pattern should bring into question the use of ad hoc cutoffs (such as "greater than 20% of loan share in AGR") to determine loan concentration/specialization in a given sector. Second, neither loan share nor loan HHI provides us with a measure of sectoral loan concentration. For example, a high CRE concentration bank should be associated with both high h_i and high s_{iCRE}. Instead,

high values of h_i in Figure 2 are associated with high *and* low values of s_{ij}. The pattern is similar across all sectors.

A simple and yet workable solution to the problems above is to develop a new *loan concentration measure* (LCM) for each sector. The LCM (λ_{ij}) for bank *i*'s loans in sector *j* is proposed as follows

$$\lambda_{ij} = h_i \times s_{ij}$$

The distribution of LCM (λ_{ij}) and loan share (s_{ij}) is shown in Figure 3. In contrast to Figure 2, high values of LCM (λ_{ij}) in Figure 3 are associated only with high values of s_{ij}. In this way, the LCM measure captures both high loan share in a given sector and high bank-level loan concentration. Details on the LCM distributions for each sector are given in Panel B of Table 2 along with the distribution of Loan HHI measure. Evidently, the distributions of the LCM measures are significantly more skewed than that of the loan share measures.

4. Loan Concentration and the Size-Profitability Relationship

In this section, we discuss how the size profitability relationship of community banks can vary with loan concentration. For loan concentration, we use the LCM measure derived above. For the size profitability relationship, we follow closely the measured association between bank asset size and its return on assets in Regher and Sengupta (2016).

4.1 The Size-Profitability Relationship

Using bank-level data during 2001-2014, Regher and Sengupta (2016) observe that returns increase with asset size but at a diminishing rate. The estimated association between size and profitability accounts for bank specific and market specific factors that also affect bank

profitability. As a result, conditional profitability increases up to a threshold asset size, beyond which the returns diminish. While the estimated association has been attributed to economies of scale for small community banks, not much is known about to how this association may vary with bank specialization or loan concentration. As stated earlier, the wide variety of loan concentrations among small community banks makes it amenable to this study.

As a first step, we estimate the size-profitability in Regehr and Sengupta (2016) with two changes to their model. First, as has been mentioned before, we include small community banks with less than $10 billion in asset size.[6] Second, in addition to the controls included in Regehr and Sengupta (2016), we include the LCMs as controls that account for variations in profitability.

Table 3 presents the results of fixed effects regressions with adjusted ROAA as the dependent variable. Following Regehr and Sengupta (2016), the regressions include dummy variables for the Crisis period (2007-2009) and the Post Crisis period (2010-2014). Both models include the size variables interacted with period dummies. In addition to the LCMs, the base model (1) includes size, size^2, and other financial controls such as the loan-to-asset ratio, securities-to-asset ratio, and the core deposit-to-total deposit ratio. Model (2) adds the bank-specific and market-specific controls to those in model (1). For a full list of bank and market specific control variables, see Table 1.

The results in Table 3 are similar to those in Regehr and Sengupta (2016). The positive coefficient on the size variable and the negative coefficient on the size^2 variable establish a concave size-return relationship in which returns are increasing with size at a decreasing rate. The crisis and size interaction terms are statistically significant but the post-crisis and size

[6] Regehr and Sengupta (2016) used a $100 billion size threshold. The rationale behind focusing exclusively on community banks is that they tend to be more diversified in terms of their sectoral loan distribution.

interaction terms are not. Therefore, the estimated size-profitability relationship changed significantly over the crisis years but is not significantly different over the pre and post-crisis expansions.

The estimated size profitability relationship shown in Table 3 is illustrated in terms of Figure 4. Model (2) is chosen to trace out the size-profitability relationship for community banks of less than $10 billion in size. Conditional on all other covariates being held at their mean values, predicted ROAA occurs is maximized at a size of $2 billion in real 2014 dollars.

Figure 5 illustrates the same relationship for the crisis period using the interaction terms. While the crisis lowers the profitability of all banks, its effect is greater for larger community banks. This lowers the size at which returns are maximized. Since the interaction terms for size and the post-crisis period are not significant, we conclude that the size-profitability relationship remains unaltered in the post-crisis period. We conclude that the crisis was a disruptive period that needs to be accounted for in determining the equilibrium relationship between bank size and profitability,

The size-profitability relationship derived above is used to determine whether this relationship varies with loan concentration. In this regard, it is important to account for the anomalous behavior of the size-profitability relationship during the crisis period. Therefore, in subsequent regressions size is always interacted with period dummies to net out the effect of the crisis period.

4.2 Does the Size-Profitability relationship vary with LCM?

Call report data does not provide us bank returns disaggregated by sector. As a result, the data poses some limitations in determining the association of loan concentration with the size-

profitability relationship. Nevertheless, the empirical methodology adopted here is fairly simple: We interact each of the LCMs with the size variables in determining whether the size profitability relationship varies with loan concentration. We study three such interactions. The first is a partial interaction model where, in addition to model (2) of Table 3, we include the size and LCM interaction terms. The second is another partial interaction model where we combine size, LCM and period dummy interactions. In this model, only the bank specific and market specific explanatory variables are not interacted. The final model is a fully interacted regression where the size, bank specific, and market specific variables are interacted with each of the LCMs and the period dummy variables.

Our results suggest that the size-profitability model is significantly different for banks with higher RRE concentration relative to other community banks—banks that are diversified or concentrated in other sectors (low RRE concentration). However, the size profitability relationship does not vary significantly with loan concentration in other sectors.

Table 4 presents the estimated coefficients for the partial and fully interacted models. The estimates for CRE (columns 1-3) do not show any statistically significant association between concentration and the size-profitability relationship. On the other hand, the estimates for RRE (columns 4-6) show a statistically significant relationship between concentration and the size-profitability relationship. The size-RRE concentration interaction terms are statistically significant at the 1% or 5% levels. They also have similar sign and magnitude across the 3 different specifications in Table 4.

Given the multitude of interaction terms in each model, we use graphical techniques to illustrate how the size-concentration relationship varies with RRE concentration. Figure 6 illustrates how RRE concentration alters the size-profitability relationship. Using standard model

selection techniques, the fully interacted model is chosen over the partially interacted models in Table 4 for the purposes of illustration.[7] The LCM values for RRE concentration is 0.9 at the 25th percentile and 3.6 at the 75th percentile.[8] The dotted line in Figure 6 shows size profitability relationship with RRE concentration at the 25th percentile. The bold line in Figure 6 shows size profitability relationship with RRE concentration at the 75th percentile. Conditional returns with a 75 percent RRE concentration are maximized at a size of $1.3 billion while those with a 25 percent RRE concentration are maximized at a size of $1.8 billion.

The graph illustrates how the size profitability relationship changes with RRE concentration. For smaller community banks, there is no difference in the size profitability relationship between high RRE and low RRE concentration banks. But higher RRE concentration is associated with lower returns for larger community banks, especially those around and over a billion dollars in asset size.

Given that our sample period includes the financial crisis, lower returns at higher concentration is not unanticipated. In fact, with higher CRE concentration, our model yields a lower return for community banks of all sizes. Given that the residential sector also performed poorly during the financial crisis, a lower return with greater RRE concentration is to be expected. What is unanticipated, therefore, is that smaller community banks with higher RRE concentration performed no less poorly than those with lower RRE concentration.

There are several reasons as to why smaller community banks with high RRE concentration did not perform as poorly. One possible explanation here is that smaller community banks operate under a different business model than larger community banks because

[7] Both Akaike information criterion (AIC) and Bayesian information criterion (BIC) model selection methods yield the same result in selecting the fully interacted model over the partial interaction models.
[8] While there is no one-to-one correspondence between LCMs and their corresponding loan shares, it is important to note that at the 25th percentile of the loan share distribution, RRE loan shares are 8.4% of total assets and at the 75th percentile they are 22.3% of total assets.

they retain most of their mortgage loans (Office of the Comptroller of Currency, 2015). Therefore, it is likely that smaller community banks with high RRE concentration had better underwriting on retained mortgages and/or were successful in renegotiating their loans during the crisis. To the extent that larger community banks with high RRE concentration were involved in the "originate-to-distribute" channels, renegotiation would be significantly more costlier, and in some extreme cases, prohibitive.[9] Another factor here is that larger community banks are more likely operate in urban areas where the decline in real estate prices were severe compared to smaller community banks that are more likely operating in areas where the downturn in real estate prices is relatively modest. Clearly, more research is needed to understand the relatively better performance of smaller community banks with high RRE concentration.

The result on how the size profitability relationship changes with RRE concentration is robust to different specifications. The results in Table 4 were replicated using dummy variables for the crisis period only and dummy variables for each year. In other specifications, we also excluded the concentration variables that were not interacted with the size variables as controls.[10] Finally, we decomposed the asset size variable into the different loan components, one for each sector, and regressed returns on the size and size^2 of each sector. The results are shown in Table A.1 in the Appendix. Here too, overall returns are estimated as a concave function the size of the RRE sector in each bank. This lends support to the earlier result that the size-profitability relationship varies significantly with the size of the RRE sector, and thereby, the concentration of RRE within the bank.

[9] Bassett and Driscoll (2015) show that banks of asset size between $1 billion and $10 billion are an important part of the "originate-to-distribute" model and have profited from the same since 2007. However, they are unable to examine the status of the business model for small community banks and for large community banks before 2007 because of data limitations.

[10] These results are available upon request.

5. Loan Concentration, Bank Failures, Fire Sales and Acquisitions.

We take a broader approach to determining bank performance by including the survival of the bank as a going concern. Accordingly, in studying the association between sectoral loan concentration and bank performance, we examine how concentration affects bank survival, and conversely, bank "death". Such end-of-life scenarios for a bank include bank failure or an acquisition. We define an acquisition as the purchase of one bank by another bank, without the purchase being arranged by the FDIC, with the charter of the purchased bank being discontinued, and that of the purchasing bank continuing to exist.

Our data on bank failures and acquisitions come from the National Information Center (NIC) database, which is maintained by the Federal Reserve System. The data include information on failures and acquisitions, the banks involved, and the date of event. While all failures are the result of poor performance, all acquisitions are not. Accordingly, we distinguish between acquisitions of poorly performing banks, which we shall term "fire sales", from all other acquisitions. A bank is defined to be poorly performing prior to acquisition if (1) it had negative ROAA in the last year prior to acquisition or (2) if it had negative ROAA in any of its last 3 years and its ROAA for each of the last 3 years was below the 10^{th} percentile. All such acquisitions are termed as fire sales in our sample. Therefore, we consider 3 end-of-life events for banks in our sample: bank failures, acquisitions, and acquisitions of poorly performing banks or fire sales.

We wish to examine the hazard, or risk, of banks disappearing due either to acquisition, fire sales, or to failure. We assume that the causal processes for acquisitions, fire sales, and failures are different. We analyze the disappearance of banks using Cox (1972) proportional hazard models using the same determinants as in our returns regressions. In modelling the failure

hazard, acquired banks are treated as censored at the date of acquisition; in modelling the acquisition hazard, banks that failed are treated as censored at the failure date. This approach assumes that censoring does not provide any information about latent failure times beyond that available in the covariates.

The results of the hazard model estimation showing the estimated hazard ratios are reported in Table 5. A hazard ratio greater than 1 indicates that the increase in the explanatory variable is associated with an increase in the failure or acquisition hazard; the converse is true for a hazard ratio that is less than 1. Higher CRE concentration raises the risk of failures (models 1-3), fire sales (models 4-6) and acquisitions (models 7-9), thereby lowering the odds of survival. In particular, the increase in the hazard of failure (between 2.3 to 3.3 percent) is marginally greater than the increase in the hazard of acquisition (between 1.4 to 2.2 percent). Higher CON concentration reduces the odds of bank failure whereas higher AGR concentration reduces the odds of a fire sale. If poorly performing AGR banks are remotely located, there may be a difficulty in finding willing buyers even at fire sale prices. At the same time, higher CNI concentration raises the risk of being acquired. This result suggests that acquirers are more likely to target those banks that have built up expertize in lending to small businesses.

The hazard ratios on the control variables are also along expected lines. For example, increases in local unemployment rate increases the hazard of failures (models 2-3) but lowers the hazard of acquisitions (models 8-9). Higher funding share from core deposits raises the hazard of acquisitions but lowers the hazard of failures. The hazard of acquisitions, even in fire sales (model 6), is significantly lower for Subchapter S banks.

In addition to the results presented in Table 5, we run two sets of regressions to check the robustness of our results. The first set of regressions is a dynamic probit with each end-of-life

event treated as the binary variable that takes the value one in the year when the event occurs and zero otherwise. The estimates of this regression in presented in Table A.2 in the appendix. The results in Table A.2 are qualitatively similar to those in Table 5. A bank's operational or managerial efficiency is arguably an important determinant of bank disappearance (Wheelock and Wilson, 2000). We include the lagged efficiency ratio, the ratio of non-interest expenses to total assets and a proxy for operational efficiency, as an explanatory variable in all our regressions in Table 5. These results of this second set of regressions are similar to those in Table 5 and presented in Table A.3 in the appendix.

6. Changes in Loan Concentration: Large Jumps in Concentration

After studying how bank performance varies with loan concentration in the previous two sections, we examine how performance varies with *changes* in loan concentration in this section and the next. Changes in sectorwise LCMs are calculated on an annual basis for each bank. We distinguish between two types of changes that might affect bank performance. The first occurs if there are significantly large changes in terms of our concentration measure over a short period of time. The second occurs when changes in concentration are accompanied by a switch in specialization within a short period of time. In this section, we discuss changes in performance associated with the first type of change. The second type of change is discussed in Section 7.

We consider 1-year and 2-year changes of the first type that are significantly large. A 1-year change in concentration is significantly large if it is greater than 2 standard deviations of the LCM for that sector. A 2-year change in concentration is significantly large if it is greater than 3 standard deviations of the LCM for that sector. We study how bank performance varies with large 1-year changes and large 2-year changes in each sector.

Table 6 shows the distribution of large 1-year and 2-year changes in LCMs for banks during the pre-crisis expansion, crisis and the post-crisis expansion. It is not surprising to find a relatively high number of large 1-year and 2-year changes in CRE and RRE LCMs during pre-crisis expansion. Another notable feature is the high number of negative changes in CNI LCMs during this period. We also find a relatively high number of large negative changes in the CRE LCM during the crisis and post-crisis periods. Going forward, we view these changes as "events" and study the behavior of bank performance before and after the "event." We treat positive and negative changes in LCM as different events.

To determine how bank performance varies with significantly large changes in the LCM, we estimate the following fixed effects regression:

$$adjROA_{it} = d_i + \beta_1 \mathrm{S} + \beta_3 \lambda + \alpha_1 PRE\Delta dummy_{ijt} + \alpha_2 POST\Delta dummy_{ijt} + bank\ controls + mkt\ controls + year\ dummies + \epsilon_{it}$$

The three subscripts i, j, and t refer to bank i, sector j and year t. $adjROA_{it}$ is the annual returns for bank i in year t. The d_i term represents the fixed effect for bank i. The term ϵ_{it} is an independent and identically distributed (i.i.d) disturbance. For bank i in sector j, $PRE\Delta dummy$ is a dummy variable that takes the value 1 for the year τ and $(\tau - 1)$ where the significantly large change in LCM occurs in year τ. On the other hand, the $POST\Delta dummy$ equals one in years $(\tau + 1)\ and\ (\tau + 2)$ following the year τ in which the large change in LCM occurred. For each sector, we run the regressions separately for the positive and negative changes. The coefficients α_1 and α_2 estimate how returns vary with large changes in concentration in years preceding and following the change, respectively.

Table 7 shows the estimates for α_1 and α_2 for large *positive* 1-year and 2-year changes in CRE and RRE. The estimates show that large positive changes in CRE concentration are

preceded by large increases in overall ROAA. Likewise, large positive changes in CRE concentration are followed by large changes in ROAA. On an index of 1 to 100, an increase in the LCM for CRE by 1 point is associated with statistically significant increases in returns by around 40-70 basis points. This result is likely driven by the boom years in the CRE market where banks raised their CRE loan shares following an increase in returns. These associations hold for both for large *positive* 1-year and 2-year changes in the LCM for CRE. However, the estimates for changes in the LCM for RRE are not statistically significant. The same holds true for the other 3 sectors, whose results are not shown here but available upon request.

Table 8 shows the estimates for α_1 and α_2 for large *negative* 1-year and 2-year changes in CRE and RRE. Again, the estimates show that large negative changes in CRE concentration are preceded by significant decreases in overall ROAA and are followed by significantly large decreases in returns. On an index of 1 to 100, an increase in the LCM for CRE by 1 point is associated with statistically significant decreases in returns by around 62-97 basis points preceding the change but even larger decreases of 1.0-1.7 percentage points in returns following the change. We believe this result is driven by the bust years in CRE as banks withdrew from the CRE market following large losses but were unable to stem the losses despite reducing CRE concentration. These associations hold for both for large *negative* 1-year and 2-year changes in the LCM for CRE. Again, the estimates for changes in the LCM for RRE (and other 3 sectors) are not statistically significant.[11] In summary, the variance in bank performance preceding and following large changes in sectoral concentration has been largely driven by the loans in the CRE market. Indeed, they are suggestive of herding behavior by banks during the boom-bust years in CRE.

[11] The results for the other 3 sectors are not shown here, but available upon request.

7. Changes in Concentration: Switching Specialization

In this section, we study changes of the second type as discussed above, namely, a switch in bank specialization. Loosely defined, a bank is viewed as specializing in the sector in which it has the highest loan concentration (LCM). Two considerations are important here. First, a switch in concentration is viewed as a change in the "business model" of the bank. In our framework, we treat each of the 5 sectors as independent. In this sense, all switches in specialization are similar and independent of the sectors involved in the switch. Second, banks can specialize in more than one sector. So, before we define a switch in specialization, we need to determine the number of specializations for a bank.

To determine the number of specializations, we first we rank the 5 sectors for each bank by LCMs as $\lambda_{it}^{(1)}, \lambda_{it}^{(2)}, \ldots, \lambda_{it}^{(5)}$ where $\lambda_{it}^{(k)}$ is the LCM of the k-th ranked sector for the bank i in year t. Given that bank i in year t has the same h_i, this is equivalent to ranking the sectors by loan shares, s_{ij}. We define the difference in LCMs between the top ranked sector with the k-th ranked sector to be

$$\Delta LCM_{ij}^{k} = \lambda_{it}^{(1)} - \lambda_{it}^{(k)}$$

The highest standard deviation of the LCM measures in our sample is 0.16 for CRE. If $\Delta LCM_{ij}^{k} \geq 0.16$, then we define $(k-1)$ as the number of specializations for bank i in year t. Therefore, a bank with LCMs of 0.33, 0.25, 0.18, 0.12 and 0.05 has 3 specializations.

Using this methodology, we select banks with only 1 or 2 specializations in year τ. We determine that a "switch" has occurred if a sector ranked 3rd, 4th or 5th in year τ emerges as the top ranked sector at any time in years $\tau+1, \tau+2$ or $\tau+3$. A bank for which this switch has occurred (after the first 3 years of its existence) is denoted as a bank that has switched

concentration. We define a dummy variable *switch* that equals one for all banks that switch concentration and zero otherwise. There are 304 banks in our sample that switch concentration.

How does switching concentration affect bank survival? We repeat the survival analysis in section 5 with the *switch* dummy variable as one of the covariates. The results of the hazard estimation are presented in Table 9. It is important to point out that for all other variables, the results remain similar to those obtained in Table 5. The focus of our attention is the estimated coefficients on the variable switch in Table 9. Clearly, switching concentration raises the risk of failure (columns 1-3) but reduces the risk of being acquired. In all cases, the associations are fairly large and statistically significant. For example, switching is estimated to increase the hazard of failure by around 40-46 percent while reducing the hazards of fire sales and acquisitions by 32-36 percent and 35-36 percent, respectively.

Thus, switching concentrations leads to poorer performance in terms of higher risk of failure. It makes the bank less attractive as acquirers tend to avoid switching banks. This would suggest that switching concentration can lead to poorer performance, and worse still, a loss of charter value for the bank. Most of the switches in our sample have been from other sectors into CRE. Banks entering to CRE during the boom performed poorly in the subsequent downturn. Therefore, we believe that these results are influenced by the CRE boom-bust cycle.

We repeat the robustness exercise in section 5 for the results in section 7 as well. As in section 5, we run two sets of regressions to check the robustness of our results. The first set of regressions is a dynamic probit with each end-of-life event treated as the binary variable that takes the value one in the year when the event occurs and zero otherwise. The estimates of this regression in presented in Table A.4 in the appendix. Again, the results in Table A.4 are

qualitatively similar to those in Table 9. Next, we run the set of regressions similar to Table A.3 including the lagged efficiency ratio as an explanatory variable in all our regressions in Table 9. The results of this second set of regressions are also similar to those in Table 9 and presented in Table A.5 in the appendix. To summarize, switching concentrations raises the risk of unfavorable outcomes like failure but also lowers the odds of being acquired as a target.

8. Conclusion

The paper develops a simple measure of sectoral loan concentration for US community banks. Our study on sectoral loan concentration raises important questions on the use of ad hoc cutoffs in determining bank concentrations in a particular sector. Instead, the distribution of loan shares and loan concentrations lead us to conclude that continuous measures of concentration, such as the one developed here, may be preferable.

We find that the size profitability relationship among community banks varies with RRE concentration. Greater RRE concentration is associated with lower returns, especially for larger community banks above the billion-dollar size and this result is fairly robust to different specifications. While loan concentration in other sectors does not affect the size profitability relationship, they do affect the risk of bank survival. Using the loan concentration measure developed here, we find that higher CRE concentration raises the risk of failures, fire sales and acquisitions, thereby lowering the odds of survival. In contrast, higher CON concentration lowers the odds of failure while higher AGR concentration reduces the odds of a fire sale.

We also examine how bank performance varies with changes in concentration. We find that the results for changes in concentration are driven largely by the boom and bust in the CRE market during our sample period. Large positive (negative) changes in CRE concentration are

preceded by large increases (decreases) and followed by large increases (decreases) in overall returns. These results are suggestive of herding on the part of banks into and out of the CRE sector during the boom-bust cycle. Our results also show that banks that switch specialization increase the hazard of failure but decrease the odds of being acquired. Here too, activity during the CRE boom bust cycle may be driving the results with banks that switched concentration during the boom raising the odds of failure.

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Figure 1: Loan Share Distribution by Sector

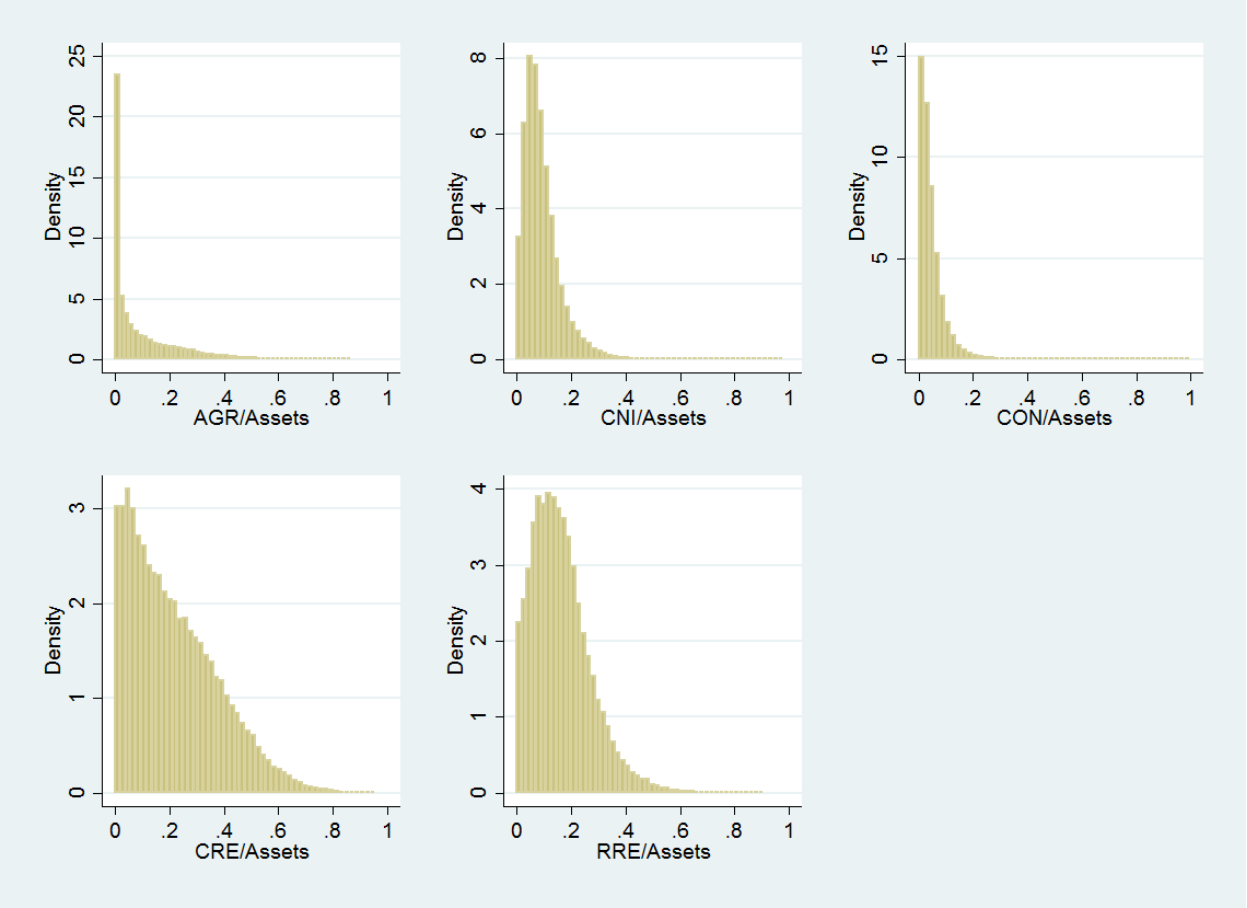

Figure 2: Bank Loan HHI and Loan Shares by Sector

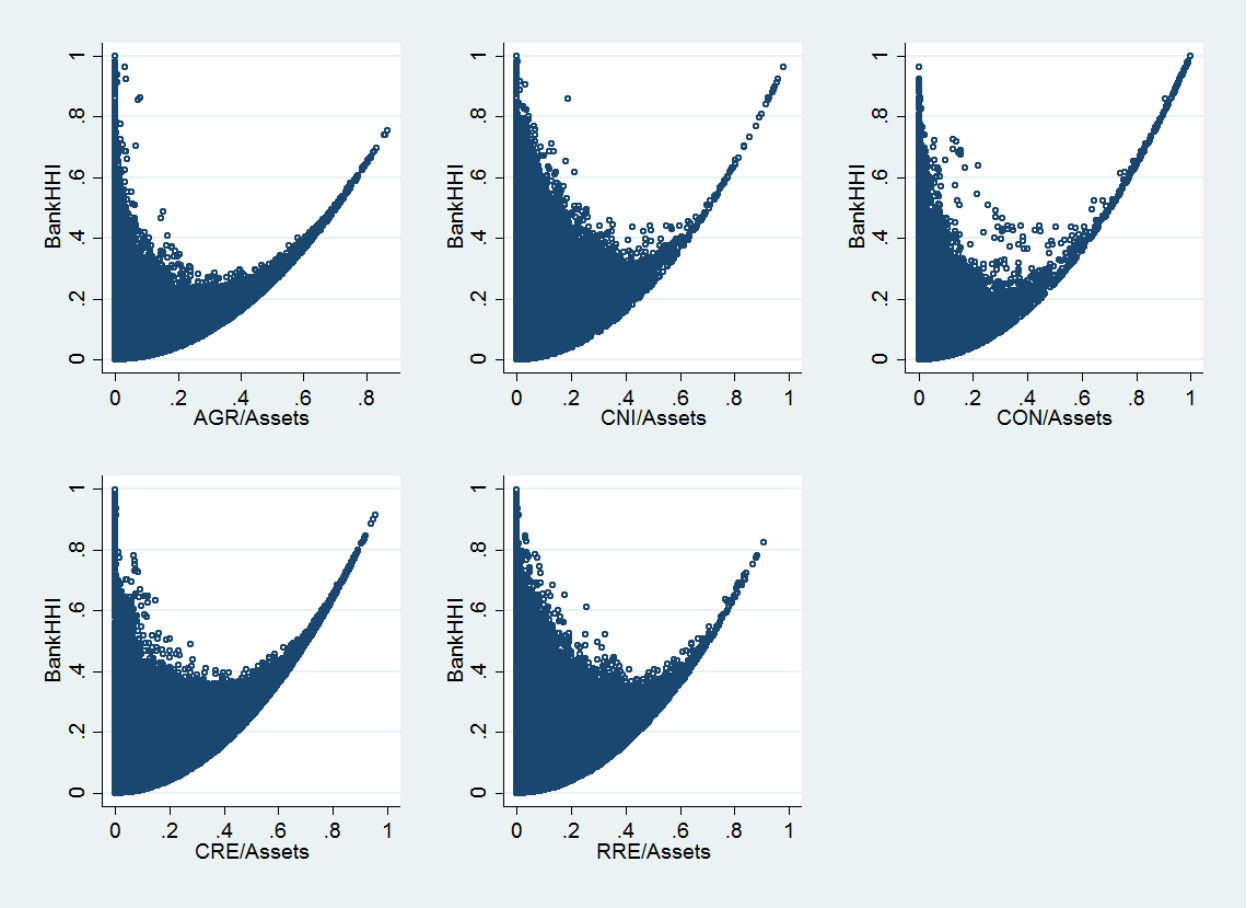

Figure 3: Loan Concentration Measure (LCM) and Loan Shares By Sector

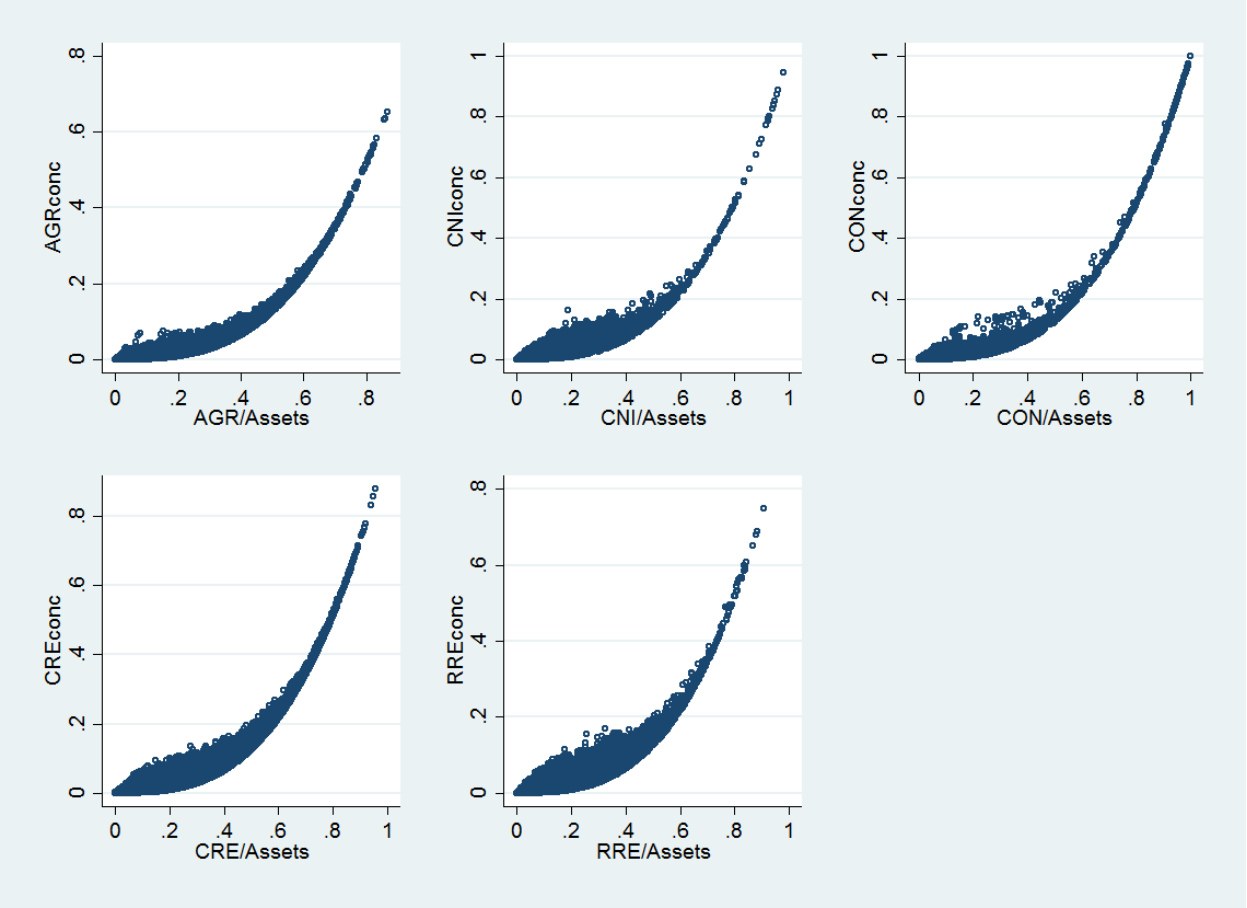

Figure 4: The Size Profitability Relationship

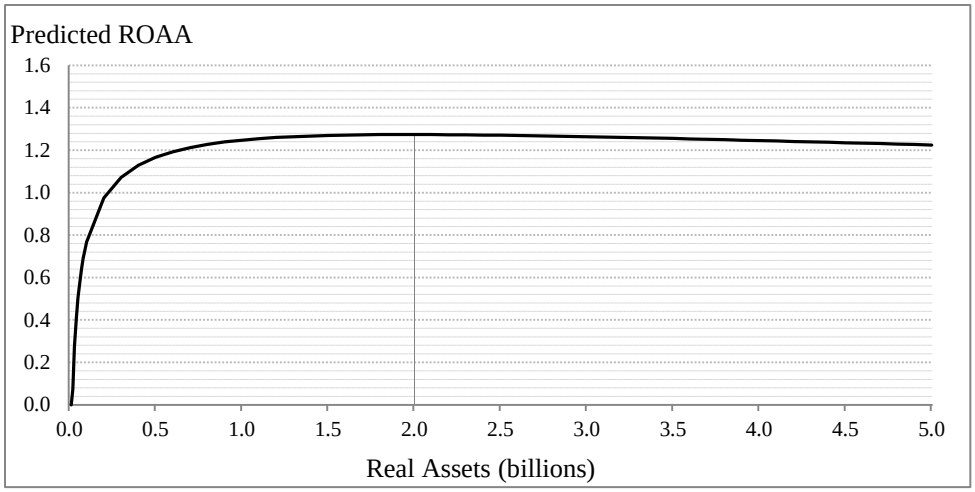

Figure 5: The Size Profitability Relationship: Crisis Years and Non-Crisis Years

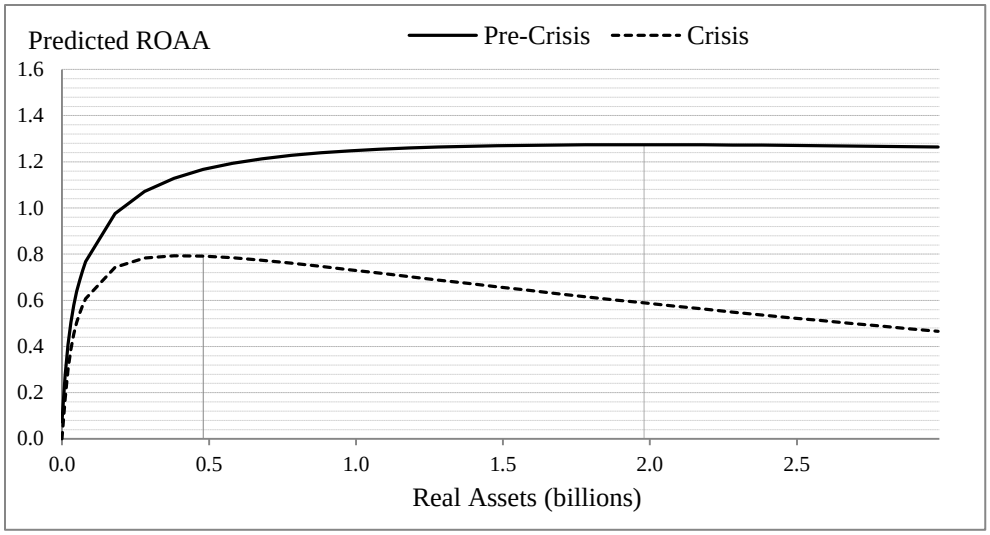

Figure 6: The Size Profitability Relationship: Variations with RRE concentration

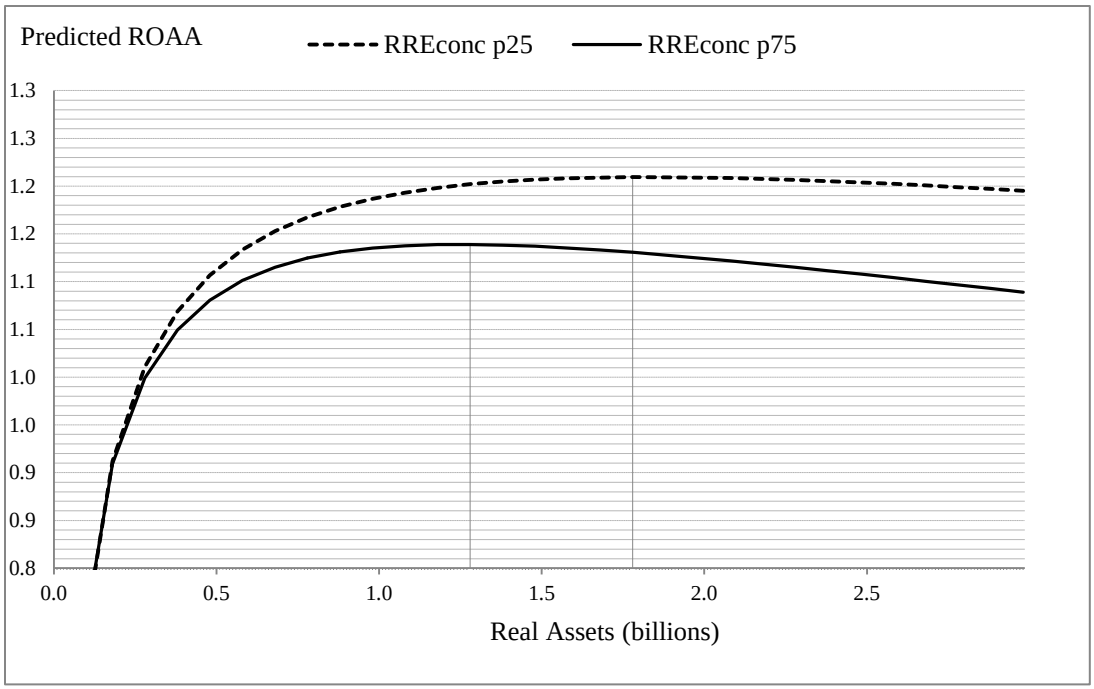

Table 1: List of Variables

Variable	Description
Return on Average Assets (ROAA)	Annual net income divided by average total assets over the year. For S-Corp banks net income is adjusted to account for differences in tax treatment.
Bank-Specific Controls	
Size	Natural logarithm of real assets measured in 2014 dollars.
Risk	Volatility of bank earnings measured by the standard deviation of quarterly ROAA for prior three years.
Loan to asset ratio	Total loans divided by total assets
Security to asset ratio	Total securities divided by total assets
Core deposit to deposit ratio:	Sum of transactions accounts, money market deposit accounts, time deposits of less than $100,000, and other non-transaction savings deposits divided by total deposits.
S-Corp bank	Bank that has elected to be taxed under subchapter S of the tax code
Single-market bank	Bank that has at least 99 percent of its deposits in a single market.
Rural bank	Bank that has at least 90 percent of its deposits in counties located outside of metropolitan or micropolitan statistical areas
Market Specific Controls	
Market HHI	Sum of squared bank deposit shares in a market. For multimarket banks, HHI is weighted by the relative size of the population. (Source: Summary of Deposits, FDIC)
Population	Natural logarithm of annual market population. For multimarket banks, population is the sum of the population in every market area in which the bank has a branch. (Source: Census Bureau)
Unemployment Rate	Annual market unemployment rate. For multimarket banks, unemployment rate is weighted by the relative size of the labor force.
Real GDP Growth:	Annual growth rate of real GDP (Source: Bureau of Economic Analysis)

Table 2: Summary Statistics: Loan Shares, Bank Loan HHI and Loan Concentration Measure (LCM)

Panel A: Distribution of Loan Shares by Sector

	mean	sd	min	p10	p25	p50	p75	p90	p95	p99	max
AGR	0.092	0.126	0	0	0.003	0.033	0.136	0.278	0.367	0.532	0.867
CNI	0.097	0.074	0	0.027	0.048	0.080	0.125	0.185	0.233	0.352	0.981
CON	0.052	0.065	0	0.006	0.017	0.036	0.066	0.108	0.144	0.271	0.999
CRE	0.218	0.163	0	0.033	0.082	0.186	0.323	0.451	0.524	0.667	0.957
RRE	0.164	0.108	0	0.040	0.084	0.148	0.223	0.307	0.363	0.491	0.934

Panel B: Bank Loan HHI and Loan Concentration Measure (LCM)

	mean	sd	min	p10	p25	p50	p75	p90	p95	p99	max
BankHHI	0.158	0.103	0	0.052	0.089	0.139	0.204	0.284	0.347	0.510	0.999
AGRconc	0.014	0.032	0	0	0	0.004	0.014	0.036	0.062	0.160	0.652
CNIconc	0.016	0.023	0	0.002	0.005	0.011	0.021	0.036	0.049	0.086	0.946
CONconc	0.008	0.033	0	0.001	0.002	0.004	0.008	0.015	0.020	0.046	0.998
CREconc	0.045	0.063	0	0.002	0.008	0.022	0.056	0.114	0.164	0.308	0.878
RREconc	0.027	0.031	0	0.003	0.009	0.019	0.036	0.058	0.077	0.141	0.815

Table 3. The Size Profitability Relationship
Fixed Effect Regression with Adjusted ROAA as the dependent variable.

	(1)	(2)
VARIABLES	Base	With Controls
size	2.612***	2.437***
	0.901	0.881
$size^2$	-0.0598**	-0.0569**
	0.0236	0.0230
Crisis	-6.904*	-8.906**
	3.795	3.752
Post-Crisis Expansion	1.501	-0.918
	3.977	3.860
Crisis#size	0.829**	1.034***
	0.396	0.391
Post-crisis#size	-0.109	0.123
	0.413	0.401
Crisis#size#size	-0.0260**	-0.0304***
	0.0103	0.0102
Post-Crisis#size#size	0.000335	-0.00416
	0.0107	0.0104
AGRconc(-1)	0.0103*	0.00247
	0.00612	0.00616
CNIconc(-1)	-0.00279	-0.0107
	0.0138	0.0136
CONconc(-1)	-0.0134	-0.0182
	0.0187	0.0189
CREconc(-1)	-0.0180***	-0.0205***
	0.00508	0.00502
RREconc(-1)	-0.00239	0.000893
	0.00634	0.00635
Loan/Assets(-1)	0.0151***	0.0168***
	0.00440	0.00438
Securities/Assets(-1)	0.0149***	0.0124***
	0.00222	0.00215
Core Deposits/Total Deposits(-1)	0.00554***	0.00307*
	0.00189	0.00185
Risk(Std. Dev)		-0.0975***
		0.0222
Subchapter-S Bank		0.0545**
		0.0228
Rural Bank		0.00820
		0.0406
Single Mkt Bank		0.141***
		0.0311
Population level		-0.0539***
		0.0134
HHI		-0.0251
		0.202
Unemployment rate		-0.129***
		0.00476
GDP growth		0.0507***
		0.00372
Constant	-28.58***	-25.33***
	8.524	8.370
Observations	89,723	89,450
Number of ID	8,762	8,698
Adjusted R-squared	0.049	0.083

Table 4. The Size Profitability Relationship Interacted with CREconc and RRE conc
Fixed Effect Regression with Adjusted ROAA as the dependent variable.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Partial1	Partial2	Full	Partial1	Partial2	Full
size	1.920*	2.549**	2.620**	1.995**	1.921**	2.225**
	1.033	1.063	1.078	0.973	0.960	0.967
size#size	-0.0428	-0.0610**	-0.0616**	-0.0453*	-0.0434*	-0.0498**
	0.0272	0.0280	0.0283	0.0254	0.0251	0.0253
RREconc(-1)	0.000987	0.00213	-0.000100	-1.790***	-1.846***	-1.280**
	0.00634	0.00632	0.00617	0.573	0.606	0.651
size#lagRREconc				0.187***	0.195***	0.136**
				0.0591	0.0620	0.0693
size#size#lagRREconc				-0.00489***	-0.00510***	-0.00387**
				0.00152	0.00159	0.00180
CREconc(-1)	-0.640	0.861	0.648	-0.0209***	-0.0207***	-0.0169***
	0.873	1.089	1.097	0.00503	0.00501	0.00494
size#lagCREconc	0.0684	-0.0855	-0.0683			
	0.0872	0.110	0.112			
size#size#lagCREconc	-0.00187	0.00216	0.00169			
	0.00218	0.00277	0.00281			
Crisis	-7.373*	-7.366	-7.280	-8.461**	-9.572*	-8.628*
	3.907	4.606	4.561	3.749	5.069	5.220
Post-Crisis Expansion	-0.692	-3.036	-3.130	-0.955	-1.772	-0.985
	3.963	5.458	5.571	3.865	6.061	6.227
Crisis#size	0.867**	0.817*	0.779	0.987**	1.103**	1.010*
	0.406	0.481	0.475	0.391	0.528	0.545
Post-Crisis#size	0.101	0.311	0.316	0.128	0.232	0.139
	0.411	0.571	0.583	0.401	0.634	0.652
Crisis#size#size	-0.0258**	-0.0226*	-0.0211*	-0.0291***	-0.0320**	-0.0300**
	0.0105	0.0125	0.0124	0.0102	0.0137	0.0142
Post-Crisis#size#size	-0.00363	-0.00770	-0.00812	-0.00431	-0.00743	-0.00504
	0.0106	0.0149	0.0152	0.0104	0.0166	0.0170
AGRconc(-1)	0.00263	0.00375	0.00182	0.00264	0.00294	0.00132
	0.00615	0.00616	0.00617	0.00615	0.00613	0.00595
CNIconc(-1)	-0.0103	-0.0126	-0.0177	-0.0110	-0.0122	-0.0114
	0.0136	0.0136	0.0141	0.0136	0.0137	0.0136
CONconc(-1)	-0.0182	-0.0167	-0.0179	-0.0185	-0.0187	-0.0182
	0.0191	0.0191	0.0186	0.0190	0.0189	0.0185
Bank & Mkt Controls	yes	yes	yes	yes	yes	yes
Size & Conc. Interactions	yes	yes	yes	yes	yes	yes
Crisis & Conc. Interactions		yes	yes		yes	yes
B&M controls Interacted			yes			yes
Observations	89,450	89,450	89,450	89,450	89,450	89,450
Number of ID	8,698	8,698	8,698	8,698	8,698	8,698
Adjusted R-squared	0.084	0.094	0.116	0.084	0.084	0.095

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table 5. Survival Status and Loan Concentration Measure

Table shows the estimated hazard ratios of the hazard model estimation for bank failures (models (1)-(3)), for fire sales (models (4)-(6)), and acquisitions (models (7)-(9)).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	failed	failed	failed	fire sale	fire sale	fire sale	acquired	acquired	acquired
size	1.134**	1.031	1.042	0.773***	0.693***	0.672***	1.088***	1.036	1.048*
	(2.44)	(0.54)	(0.67)	(-4.75)	(-6.46)	(-6.91)	(3.97)	(1.51)	(1.92)
AGRconc(-1)	0.842***	0.915*	0.918*	0.714***	0.779***	0.795***	0.996	0.999	1.003
	(-2.85)	(-1.73)	(-1.69)	(-6.06)	(-5.08)	(-4.84)	(-0.40)	(-0.10)	(0.29)
CNIconc(-1)	0.990	0.988	0.972	1.011	1.004	0.984	1.033***	1.030***	1.024***
	(-0.72)	(-0.84)	(-1.61)	(0.92)	(0.33)	(-0.91)	(4.37)	(4.04)	(3.14)
CONconc(-1)	0.683***	0.739***	0.746***	0.943	0.952	0.948	1.013**	1.012**	1.010*
	(-3.48)	(-3.16)	(-3.18)	(-0.94)	(-1.13)	(-1.21)	(2.29)	(2.15)	(1.72)
CREconc(-1)	1.033***	1.027***	1.024***	1.023***	1.015**	1.013**	1.022***	1.018***	1.014***
	(6.37)	(5.06)	(4.45)	(4.16)	(2.50)	(2.16)	(6.10)	(4.72)	(3.67)
RREconc(-1)	0.998	0.997	0.989	1.000	0.998	0.989	1.007	1.007	0.998
	(-0.15)	(-0.23)	(-0.70)	(-0.03)	(-0.15)	(-0.74)	(0.77)	(0.72)	(-0.22)
Loan/Assets(-1)	1.016**	1.019***	1.036***	0.990**	0.992	1.001	0.987***	0.989***	0.991***
	(2.33)	(2.59)	(4.21)	(-1.97)	(-1.59)	(0.20)	(-4.19)	(-3.70)	(-2.60)
Securities/Assets(-1)	0.963***	0.969***	0.980**	0.962***	0.967***	0.973***	0.991***	0.993**	0.994**
	(-4.96)	(-3.91)	(-2.34)	(-8.71)	(-7.31)	(-5.70)	(-3.32)	(-2.56)	(-2.25)
Core /Total Deposits(-1)	0.972***	0.973***	0.975***	0.997	0.998	1.000	1.011***	1.011***	1.011***
	(-7.95)	(-7.07)	(-6.59)	(-0.94)	(-0.45)	(-0.07)	(4.72)	(4.43)	(4.69)
Popln. level		1.192***	1.199***		1.180***	1.144***		1.065***	1.064***
		(4.24)	(4.20)		(6.15)	(4.54)		(4.36)	(3.86)
HHI		0.989	0.914		1.069	1.260		1.127	1.189
		(-0.02)	(-0.12)		(0.13)	(0.44)		(0.55)	(0.78)
Unempl. rate		1.130***	1.118***		1.044*	1.019		0.953***	0.942***
		(4.78)	(4.19)		(1.95)	(0.81)		(-3.30)	(-4.07)
GDP growth		1.132	1.125		0.762**	0.767**		0.980	0.964
		(0.46)	(0.44)		(-2.27)	(-2.15)		(-0.25)	(-0.44)
Risk (Std. Dev)			1.120***			1.077***			0.996
			(7.42)			(5.94)			(-0.18)
Subchapter-S Bank			0.782*			0.452***			0.679***
			(-1.90)			(-7.09)			(-7.62)
Rural Bank			1.346			0.808			1.027
			(1.15)			(-1.22)			(0.34)
Single Mkt Bank			1.175			1.017			1.252***
			(1.33)			(0.17)			(4.48)
Pseudo R-squared	0.0855	0.0913	0.0974	0.0305	0.0350	0.0438	0.00287	0.00373	0.00576
Banks	8385	8385	8336	8385	8385	8336	8385	8385	8336
Observations	80967	80967	80760	80967	80967	80760	80967	80967	80760

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table 6. Distribution of Large Changes in LCMs across Pre-Crisis, Crisis and Post Crisis Periods.

Period	posch1AGR	negch1AGR	posch2AGR	negch2AGR	posch1CNI	negch1CNI	posch2CNI	negch2CNI	posch1CON	negch1CON	posch2CON	negch2CON
Pre-Crisis	49	33	41	24	48	96	48	68	33	34	38	30
Crisis	19	28	18	19	23	53	22	31	8	11	12	14
Post-Crisis	62	25	52	21	14	34	21	47	14	15	17	15
Total	130	86	111	64	85	183	91	146	55	60	67	59

Period	posch1CRE	negch1CRE	posch2CRE	negch2CRE	posch1RRE	negch1RRE	posch2RRE	negch2RRE
Pre-Crisis	124	25	95	23	70	80	54	61
Crisis	40	93	35	59	22	21	26	26
Post-Crisis	18	45	13	53	44	29	37	45
Total	182	163	143	135	136	130	117	132

Table 7. Pre and Post POSITIVE Change in LCM

Table shows estimated coefficients for the $PRE\Delta dummy$ and the $POST\Delta dummy$ in the regressions $adjROA_{it} = d_i + \beta_1 S + \beta_3 \lambda + \alpha_1 PRE\Delta dummy_{ijt} + \alpha_2 POST\Delta dummy_{ijt} + bank\ controls + mkt\ controls + year\ dummies + \epsilon_{it}$ with bank fixed effects. The regressions shown are for the 1-year and 2-year positive changes in CRE and RRE. For example, preposch2CRE is the $PRE\Delta dummy$ for the 2 –year positive change in CRE while the postposch1CRE is the $POST\Delta dummy$ for the 1-year change in CRE.

	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Variables												
preposch1CRE	0.452**	0.417**	0.579**									
	(2.51)	(2.32)	(2.24)									
postposch1CRE	0.734***	0.695***	0.726***									
	(4.34)	(4.13)	(3.41)									
preposch2CRE				0.556**	0.527*	0.679*						
				(1.99)	(1.89)	(1.68)						
postposch2CRE				0.605***	0.573**	0.694**						
				(2.65)	(2.52)	(2.47)						
preposch1RRE							0.0482	0.0141	0.0968			
							(0.50)	(0.14)	(1.04)			
postposch1RRE							0.0235	-0.00358	0.0722			
							(0.18)	(-0.03)	(0.58)			
preposch2RRE										0.129	0.0667	0.202**
										(1.30)	(0.66)	(2.08)
postposch2RRE										-0.180	-0.207	-0.124
										(-1.14)	(-1.30)	(-0.79)
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Conc. Measures	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Financial Ratios	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Market Controls		yes	yes		yes	yes		yes	yes		yes	yes
Bank Controls			yes			yes			yes			yes
adj R-squared	0.0772	0.0872	0.0862	0.0767	0.0867	0.0860	0.0758	0.0859	0.0848	0.0759	0.0860	0.0849
Banks	8282	8282	8253	8282	8282	8253	8282	8282	8253	8282	8282	8253
Observations	92403	92403	89159	92403	92403	89159	92403	92403	89159	92403	92403	89159

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table 8. Pre and Post NEGATIVE Change in LCM

Table shows estimated coefficients for the $PRE\Delta dummy$ and the $POST\Delta dummy$ in the regressions $adjROA_{it} = d_i + \beta_1 S + \beta_3 \lambda + \alpha_1 PRE\Delta dummy_{ijt} + \alpha_2 POST\Delta dummy_{ijt} + bank\ controls + mkt\ controls + year\ dummies + \epsilon_{it}$ with bank fixed effects. The regressions shown are for the 1-year and 2-year negative changes in CRE and RRE. For example, prenegch2CRE is the $PRE\Delta dummy$ for the 2 –year negative change in CRE while the postnegch1CRE is the $POST\Delta dummy$ for the 1-year change in CRE.

	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Variables												
prenegch1CRE	-0.978***	-0.978***	-0.820***									
	(-5.73)	(-5.74)	(-4.00)									
postnegch1CRE	-1.686***	-1.628***	-1.711***									
	(-3.69)	(-3.56)	(-3.01)									
prenegch2CRE				-0.624***	-0.779***	-0.676***						
				(-3.10)	(-3.96)	(-3.27)						
postnegch2CRE				-1.000***	-1.191***	-1.141***						
				(-3.90)	(-4.88)	(-4.92)						
prenegch1RRE							0.0446	0.0328	0.0160			
							(0.38)	(0.28)	(0.14)			
postnegch1RRE							0.111	0.104	0.0875			
							(0.88)	(0.84)	(0.77)			
prenegch2RRE										0.347**	0.0846	0.0510
										(1.98)	(0.58)	(0.38)
postnegch2RRE										0.103	0.0619	0.0695
										(0.68)	(0.45)	(0.54)
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Conc. Measures	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Financial Ratios	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Market Controls		yes	yes		yes	yes		yes	yes		yes	yes
Bank Controls			yes			yes			yes			yes
adj R-squared	0.0805	0.0904	0.0892	0.0392	0.0881	0.0867	0.0758	0.0860	0.0848	0.0382	0.0860	0.0848
Banks	8282	8282	8253	8297	8282	8253	8282	8282	8253	8297	8282	8253
Observations	92403	92403	89159	94952	92403	89159	92403	92403	89159	94952	92403	89159

***, **, * indicate statistical significance at the 1, 5, and 10% level

Table 9. Survival Status and Banks that Switch concentration

Table shows the estimated hazard ratios of the hazard model estimation for bank failures (models (1)-(3)), for fire sales (models (4)-(6)), and acquisitions (models (7)-(9)).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	failed	failed	failed	fire sale	fire sale	fire sale	acquired	acquired	acquired
switch	1.458**	1.440**	1.399*	0.670*	0.651**	0.641**	0.653***	0.638***	0.649***
	(2.01)	(1.97)	(1.71)	(-1.95)	(-2.08)	(-2.13)	(-3.57)	(-3.75)	(-3.58)
size	1.143***	1.040	1.057	0.772***	0.691***	0.669***	1.083***	1.029	1.041
	(2.60)	(0.70)	(0.90)	(-4.72)	(-6.43)	(-6.88)	(3.71)	(1.23)	(1.63)
AGRconc(-1)	0.847***	0.920	0.925	0.711***	0.778***	0.793***	0.993	0.996	1.000
	(-2.77)	(-1.64)	(-1.56)	(-6.07)	(-5.08)	(-4.86)	(-0.68)	(-0.35)	(0.03)
CNIconc(-1)	0.993	0.991	0.976	1.011	1.005	0.984	1.032***	1.030***	1.024***
	(-0.55)	(-0.65)	(-1.44)	(0.98)	(0.38)	(-0.90)	(4.28)	(3.97)	(3.10)
CONconc(-1)	0.683***	0.739***	0.749***	0.942	0.952	0.947	1.013**	1.012**	1.010*
	(-3.48)	(-3.16)	(-3.17)	(-0.95)	(-1.15)	(-1.23)	(2.29)	(2.14)	(1.74)
CREconc(-1)	1.035***	1.029***	1.026***	1.022***	1.013**	1.012*	1.021***	1.016***	1.013***
	(6.54)	(5.31)	(4.75)	(3.90)	(2.21)	(1.86)	(5.69)	(4.26)	(3.25)
RREconc(-1)	1.000	1.000	0.994	0.999	0.997	0.988	1.005	1.005	0.996
	(0.02)	(-0.02)	(-0.43)	(-0.09)	(-0.21)	(-0.80)	(0.59)	(0.53)	(-0.38)
Loan/Assets(-1)	1.014*	1.016**	1.031***	0.990*	0.992	1.001	0.988***	0.989***	0.992**
	(1.93)	(2.05)	(3.42)	(-1.88)	(-1.56)	(0.18)	(-3.87)	(-3.39)	(-2.33)
Securities/Assets(-1)	0.963***	0.968***	0.978**	0.961***	0.966***	0.972***	0.991***	0.993***	0.993**
	(-4.90)	(-3.91)	(-2.53)	(-8.55)	(-7.28)	(-5.66)	(-3.49)	(-2.74)	(-2.40)
Core/Total Deposits(-1)	0.972***	0.973***	0.975***	0.996	0.998	0.999	1.011***	1.010***	1.011***
	(-7.89)	(-7.00)	(-6.43)	(-0.99)	(-0.53)	(-0.23)	(4.58)	(4.27)	(4.55)
Popln. level		1.188***	1.195***		1.184***	1.147***		1.067***	1.066***
		(4.16)	(4.11)		(6.23)	(4.61)		(4.45)	(3.93)
HHI		0.958	0.893		1.082	1.272		1.133	1.192
		(-0.06)	(-0.15)		(0.15)	(0.45)		(0.57)	(0.79)
Unempl. rate		1.132***	1.123***		1.046**	1.021		0.955***	0.944***
		(4.86)	(4.34)		(2.01)	(0.88)		(-3.20)	(-3.98)
GDP growth		1.141	1.129		0.780**	0.786*		0.926	0.901
		(0.50)	(0.45)		(-2.01)	(-1.88)		(-0.80)	(-1.07)
risk(StdDev)			1.118***			1.078***			0.998
			(7.18)			(5.99)			(-0.10)
Subchapter-S Bank			0.785*			0.453***			0.677***
			(-1.86)			(-7.06)			(-7.67)
Rural Bank			1.337			0.809			1.027
			(1.12)			(-1.22)			(0.35)
Single Mkt Bank			1.196			1.004			1.244***
			(1.47)			(0.04)			(4.34)
pseudo R-squared	0.0862	0.0919	0.0980	0.0306	0.0353	0.0442	0.00320	0.00407	0.00607
Banks	8378	8378	8329	8378	8378	8329	8378	8378	8329
Observations	80925	80925	80718	80925	80925	80718	80925	80925	80718

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Appendix

Table A.1. The Sector Profitability Relationship (by real size of loan sector)
Fixed Effect Regression with Adjusted ROAA as the dependent variable.

VARIABLES	(1) Base	(2) Interacted
Crisis	-0.181***	-1.963***
	0.0138	0.495
Post-Crisis Expansion	-0.000597	-0.254
	0.0152	0.405
szAGR	-0.0449	0.0255
	0.0295	0.0388
szAGR#szAGR	0.00283	-0.00331
	0.00206	0.00261
Crisis#szAGR		-0.0606
		0.0421
Post-Crisis#szAGR		-0.0209
		0.0381
Crisis#szAGR#szAGR		0.00653**
		0.00259
Post-Crisis#szAGR#szAGR		0.00393*
		0.00227
szCNI	0.0173	0.0157
	0.0739	0.0928
szCNI#szCNI	0.00226	0.00118
	0.00419	0.00520
Crisis#szCNI		-0.0975
		0.0838
Post-Crisis#szCNI		-0.132
		0.0818
Crisis#szCNI#szCNI		0.00581
		0.00484
Post-Crisis#szCNI#szCNI		0.0104**
		0.00469
szCON	0.0878	0.0650
	0.0784	0.0934
szCON#szCON	0.00177	0.000333
	0.00457	0.00552
Crisis#szCON		0.273**
		0.133
Post-Crisis#szCON		-0.0458
		0.0921
Crisis#szCON#szCON		-0.00893
		0.00747
Post-Crisis#szCON#szCON		0.00323
		0.00535
szCRE	0.0727*	-0.269***
	0.0383	0.0436
szCRE#szCRE	-0.00218	0.0209***
	0.00230	0.00259
Crisis#szCRE		0.436***
		0.0603
Post-Crisis#szCRE		0.492***
		0.0565
Crisis#szCRE#szCRE		-0.0339***
		0.00360
Post-Crisis#szCRE#szCRE		-0.0353***
		0.00337

szRRE	0.235***	0.305***
	0.0681	0.0719
szRRE#szRRE	-0.0159***	-0.0202***
	0.00384	0.00398
Crisis#szRRE		-0.164*
		0.0909
Post-Crisis#szRRE		-0.296***
		0.0646
Crisis#szRRE#szRRE		0.0126**
		0.00495
Post-Crisis#szRRE#szRRE		0.0217***
		0.00356
Bank Controls	Yes	Yes
Market Controls	Yes	Yes
Observations	77,020	77,020
Number of ID	7,677	7,677
Adjusted R-squared	0.130	0.154

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table A.2: Survival Status and Loan Concentration Measure (Dynamic Probit)

Results show the estimates from a dynamic probit model where the binary dependent variable equals for the year in which the bank failed (models (1)-(3)), was acquired in a fire sale (models (4)-(6)), or was acquired, but not in a fire sale (models (7)-(9)).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	failed	failed	failed	fire sale	fire sale	fire sale	acquired	acquired	acquired
main									
size	0.0237	-0.0302	-0.0226	-0.0916***	-0.146***	-0.156***	0.0471***	0.0183*	0.0218**
	(1.24)	(-1.36)	(-0.85)	(-5.28)	(-7.46)	(-8.10)	(4.55)	(1.85)	(2.15)
AGRconc(-1)	-0.0428**	-0.0138	-0.0172	-0.117***	-0.0788***	-0.0739***	-0.00208	-0.00266	-0.000241
	(-2.25)	(-0.95)	(-1.05)	(-5.04)	(-3.88)	(-3.74)	(-0.49)	(-0.65)	(-0.06)
CNIconc(-1)	-0.00994	-0.0124	-0.0340**	0.000967	-0.00211	-0.0110	0.0203***	0.0162***	0.0129***
	(-1.21)	(-1.22)	(-2.12)	(0.17)	(-0.33)	(-1.35)	(4.47)	(3.90)	(3.21)
CONconc(-1)	-0.0812	-0.0493	-0.0716	-0.00310	-0.00164	-0.00567	0.00850***	0.00654**	0.00523**
	(-1.32)	(-1.17)	(-1.58)	(-0.45)	(-0.26)	(-0.73)	(2.80)	(2.44)	(1.98)
CREconc(-1)	0.0216***	0.0193***	0.0180***	0.0107***	0.00542**	0.00487**	0.0118***	0.00914***	0.00753***
	(8.11)	(6.68)	(5.77)	(4.91)	(2.30)	(2.01)	(6.38)	(5.40)	(4.44)
RREconc(-1)	-0.00361	-0.00687	-0.0145	0.000179	-0.00164	-0.00432	0.00731*	0.00735**	0.00208
	(-0.57)	(-0.81)	(-1.34)	(0.04)	(-0.31)	(-0.77)	(1.74)	(2.00)	(0.53)
Loan/Assets(-1)	0.00112	-0.0000327	0.0113***	-0.00839***	-0.00723***	-0.00305	-0.00848***	-0.00701***	-0.00598***
	(0.41)	(-0.01)	(2.61)	(-4.43)	(-3.55)	(-1.42)	(-5.87)	(-5.25)	(-4.32)
Securities/Assets(-1)	-0.0179***	-0.0168***	-0.0105***	-0.0176***	-0.0153***	-0.0121***	-0.00442***	-0.00370***	-0.00381***
	(-7.48)	(-5.96)	(-2.99)	(-9.43)	(-7.47)	(-6.47)	(-3.75)	(-3.34)	(-3.36)
Core/Total Deposits(-1)	-0.0136***	-0.0126***	-0.0130***	-0.00282**	-0.00116	-0.000332	0.00739***	0.00516***	0.00512***
	(-9.63)	(-7.93)	(-7.20)	(-2.30)	(-0.91)	(-0.25)	(6.91)	(5.44)	(5.46)
Popln. level		0.0804***	0.0791***		0.0772***	0.0608***		0.0295***	0.0301***
		(5.10)	(4.30)		(7.35)	(5.54)		(4.76)	(4.43)
HHI		-0.169	-0.265		0.154	0.175		0.126	0.137
		(-0.60)	(-0.83)		(0.91)	(1.02)		(1.38)	(1.49)
Unempl. rate		0.0819***	0.0777***		0.0391***	0.0335***		-0.0420***	-0.0422***
		(8.92)	(7.57)		(5.83)	(5.16)		(-8.84)	(-8.85)
GDP growth		-0.117***	-0.122***		-0.0366***	-0.0379***		0.0484***	0.0461***
		(-12.48)	(-11.80)		(-4.32)	(-4.39)		(7.31)	(7.00)
risk(StdDev)			0.104***			0.0589***			-0.0106
			(5.42)			(5.25)			(-0.98)
Subchapter-S Bank			-0.0926*			-0.259***			-0.179***
			(-1.67)			(-6.62)			(-8.46)
Rural Bank			0.103			-0.0886			0.0219
			(1.03)			(-1.51)			(0.70)
Single Mkt Bank			0.0428			-0.0139			0.0921***
			(0.83)			(-0.40)			(4.51)
Constant	-1.789***	-1.815***	-2.924***	0.440	0.514	0.505	-2.995***	-2.327***	-2.423***
	(-5.05)	(-4.54)	(-5.32)	(1.35)	(1.52)	(1.37)	(-13.63)	(-11.68)	(-11.33)
lnsig2u									
Constant	-12.31	-2.884***	-1.794***	-11.53	-10.96	-8.549	-1.920***	-3.898**	-9.855
	(-0.00)	(-3.57)	(-3.98)	(-0.00)	(-0.00)	(-0.04)	(-7.32)	(-2.27)	(-0.02)
Log-Likelihood	-2297.7	-2105.8	-2004.2	-3582.7	-3515.3	-3420.7	-10892.1	-10801.2	-10681.7
Banks	8762	8762	8698	8762	8762	8698	8762	8762	8698
Observations	89724	89724	89451	89724	89724	89451	89724	89724	89451

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table A.3. Survival Status and Loan Concentration Measure (with Efficiency Ratio)

Table shows the estimated hazard ratios of the hazard model estimation for bank failures (models (1)-(3)), for fire sales (models (4)-(6)), and acquisitions (models (7)-(9)).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	failed	failed	failed	fire sale	fire sale	fire sale	acquired	acquired	acquired
size	1.134**	1.032	1.037	0.772***	0.693***	0.672***	1.087***	1.029	1.042
	(2.45)	(0.57)	(0.58)	(-4.78)	(-6.46)	(-6.90)	(3.86)	(1.19)	(1.62)
AGRconc(-1)	0.842***	0.915*	0.916*	0.713***	0.778***	0.795***	0.995	0.998	1.002
	(-2.85)	(-1.73)	(-1.71)	(-6.07)	(-5.09)	(-4.85)	(-0.48)	(-0.16)	(0.21)
CNIconc(-1)	0.990	0.987	0.973	1.009	1.003	0.984	1.036***	1.034***	1.027***
	(-0.77)	(-0.90)	(-1.52)	(0.81)	(0.23)	(-0.91)	(4.92)	(4.78)	(3.74)
CONconc(-1)	0.679***	0.735***	0.751***	0.939	0.950	0.948	1.015***	1.015***	1.012**
	(-3.50)	(-3.19)	(-3.08)	(-0.96)	(-1.14)	(-1.21)	(2.64)	(2.61)	(2.09)
CREconc(-1)	1.033***	1.027***	1.023***	1.023***	1.015**	1.013**	1.022***	1.017***	1.014***
	(6.33)	(5.04)	(4.39)	(4.11)	(2.48)	(2.16)	(6.01)	(4.47)	(3.44)
RREconc(-1)	0.997	0.996	0.990	0.999	0.997	0.989	1.008	1.007	0.999
	(-0.19)	(-0.27)	(-0.68)	(-0.10)	(-0.23)	(-0.75)	(0.86)	(0.82)	(-0.13)
Loan/Assets(-1)	1.017**	1.020***	1.035***	0.991*	0.993	1.001	0.986***	0.987***	0.990***
	(2.40)	(2.68)	(4.02)	(-1.67)	(-1.31)	(0.23)	(-4.46)	(-4.09)	(-2.95)
Securities/Assets(-1)	0.964***	0.970***	0.979**	0.963***	0.967***	0.973***	0.990***	0.992***	0.993***
	(-4.85)	(-3.80)	(-2.44)	(-8.44)	(-7.08)	(-5.70)	(-3.52)	(-2.94)	(-2.59)
Core /Total Deposits(-1)	0.972***	0.974***	0.976***	0.998	0.999	1.000	1.011***	1.011***	1.011***
	(-7.84)	(-7.03)	(-6.48)	(-0.72)	(-0.29)	(-0.04)	(4.60)	(4.27)	(4.55)
Efficiency Ratio(-1)	1.005	1.007*	0.980	1.008**	1.008**	1.001	0.977	0.968	0.970
	(1.25)	(1.65)	(-1.15)	(2.31)	(2.19)	(0.25)	(-0.95)	(-1.14)	(-1.04)
Popln. level		1.191***	1.202***		1.178***	1.144***		1.071***	1.068***
		(4.21)	(4.24)		(6.04)	(4.52)		(4.54)	(4.00)
HHI		0.962	0.929		1.027	1.254		1.158	1.212
		(-0.05)	(-0.10)		(0.05)	(0.42)		(0.67)	(0.87)
Unempl. rate		1.131***	1.118***		1.045**	1.019		0.954***	0.943***
		(4.81)	(4.15)		(2.00)	(0.82)		(-3.23)	(-4.03)
GDP growth		1.132	1.126		0.764**	0.767**		0.981	0.965
		(0.46)	(0.44)		(-2.24)	(-2.14)		(-0.23)	(-0.43)
Risk (Std. Dev)			1.129***			1.077***			1.009
			(8.51)			(5.89)			(0.35)
Subchapter-S Bank			0.777*			0.452***			0.678***
			(-1.94)			(-7.08)			(-7.65)
Rural Bank			1.340			0.809			1.025
			(1.13)			(-1.22)			(0.33)
Single Mkt Bank			1.169			1.017			1.244***
			(1.29)			(0.18)			(4.32)
Pseudo R-squared	0.0856	0.0914	0.0975	0.0307	0.0352	0.0438	0.00297	0.00390	0.00590
Banks	8385	8385	8336	8385	8385	8336	8385	8385	8336
Observations	80967	80967	80760	80967	80967	80760	80967	80967	80760

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table A.4: Survival Status and Banks that Switch Concentration (Dynamic Probit)
Results show the estimates from a dynamic probit model where the binary dependent variable equals for the year in which the bank failed (models (1) -(3)), was acquired in a fire sale (models (4)-(6)), or was acquired (models (7)-(9)).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	failed	failed	failed	fire sale	fire sale	fire sale	acquired	acquired	acquired
main									
switch	0.134*	0.144*	0.115	-0.166**	-0.174**	-0.197**	-0.177***	-0.183***	-0.174***
	(1.87)	(1.83)	(1.27)	(-2.22)	(-2.29)	(-2.52)	(-3.60)	(-3.72)	(-3.51)
size	0.0160	-0.0309	-0.0249	-0.1000***	-0.153***	-0.166***	0.0342***	0.0172*	0.0217**
	(0.80)	(-1.33)	(-0.87)	(-5.33)	(-7.49)	(-7.83)	(3.72)	(1.74)	(2.08)
AGRconc(-1)	-0.0414*	-0.0133	-0.0179	-0.136***	-0.0918***	-0.0893***	-0.00113	0.000704	0.00325
	(-1.95)	(-0.80)	(-0.92)	(-6.28)	(-4.80)	(-4.60)	(-0.29)	(0.18)	(0.87)
CNIconc(-1)	-0.0144	-0.0154	-0.0410**	-0.00213	-0.00445	-0.0143	0.0178***	0.0160***	0.0134***
	(-1.50)	(-1.31)	(-2.25)	(-0.34)	(-0.66)	(-1.56)	(4.20)	(3.88)	(3.31)
CONconc(-1)	-0.249***	-0.179***	-0.206***	-0.0304	-0.0211	-0.0374	0.00762***	0.00651**	0.00561**
	(-4.31)	(-3.32)	(-3.38)	(-1.00)	(-1.05)	(-1.24)	(2.74)	(2.36)	(2.01)
CREconc(-1)	0.0195***	0.0185***	0.0178***	0.00978***	0.00495**	0.00403	0.0117***	0.0106***	0.00948***
	(7.38)	(6.19)	(5.34)	(4.04)	(1.98)	(1.51)	(7.12)	(6.33)	(5.55)
RREconc(-1)	-0.00356	-0.00588	-0.0138	-0.00130	-0.00324	-0.00581	0.00504	0.00598	0.00310
	(-0.53)	(-0.67)	(-1.22)	(-0.27)	(-0.65)	(-1.06)	(1.29)	(1.60)	(0.77)
Loan/Assets(-1)	0.00370	0.00122	0.0126***	-0.00734***	-0.00629***	-0.00180	-0.00824***	-0.00813***	-0.00761***
	(1.24)	(0.37)	(2.73)	(-3.55)	(-3.00)	(-0.75)	(-6.05)	(-6.00)	(-5.34)
Securities/Assets(-1)	-0.0183***	-0.0177***	-0.0121***	-0.0176***	-0.0152***	-0.0121***	-0.00519***	-0.00504***	-0.00529***
	(-7.41)	(-6.12)	(-3.34)	(-9.64)	(-7.66)	(-6.22)	(-4.67)	(-4.44)	(-4.49)
Core/Total Deposits(-1)	-0.0128***	-0.0121***	-0.0129***	-0.00392***	-0.00199	-0.00115	0.00601***	0.00444***	0.00450***
	(-8.66)	(-7.31)	(-6.86)	(-3.02)	(-1.47)	(-0.82)	(6.15)	(4.70)	(4.73)
Popln. level		0.0744***	0.0746***		0.0772***	0.0584***		0.0245***	0.0232***
		(4.61)	(3.85)		(7.53)	(5.25)		(3.99)	(3.37)
HHI		-0.134	-0.241		0.172	0.206		0.0749	0.105
		(-0.47)	(-0.74)		(1.00)	(1.18)		(0.81)	(1.11)
Unempl. rate		0.0846***	0.0817***		0.0473***	0.0409***		-0.0252***	-0.0258***
		(8.95)	(7.52)		(6.99)	(6.27)		(-5.60)	(-5.61)
GDP growth		-0.117***	-0.125***		-0.0299***	-0.0314***		0.0753***	0.0732***
		(-12.15)	(-11.54)		(-3.39)	(-3.48)		(10.02)	(9.72)
risk(StdDev)			0.110***			0.0633***			-0.0116
			(5.29)			(5.16)			(-0.97)
Subchapter-S Bank			-0.0913			-0.252***			-0.156***
			(-1.58)			(-6.33)			(-7.39)
Rural Bank			0.110			-0.101*			-0.00275
			(1.06)			(-1.65)			(-0.09)
Single Mkt Bank			0.0288			-0.0292			0.0836***
			(0.53)			(-0.81)			(3.99)
Constant	-1.779***	-1.851***	-2.929***	0.657*	0.618*	0.676	-2.578***	-2.286***	-2.379***
	(-4.78)	(-4.44)	(-5.06)	(1.86)	(1.70)	(1.64)	(-13.32)	(-11.58)	(-10.89)
lnsig2u									
Constant	-10.63	-2.721***	-1.552***	-14.81	-10.94	-11.22	-10.76	-12.44	-12.92
	(-0.01)	(-3.82)	(-3.83)	(-0.00)	(-0.00)	(-0.00)	(-0.01)	(-0.00)	(-0.00)
Log-Likelihood	-2228.5	-2043.8	-1950.1	-3400.9	-3332.1	-3243.5	-10083.7	-9980.9	-9906.4
Banks	8479	8479	8439	8479	8479	8439	8479	8479	8439
Observations	89401	89401	89152	89401	89401	89152	89401	89401	89152

***, **, * indicate statistical significance at the 1, 5, and 10% level.

Table A.5: Survival Status and Banks that Switch concentration (with Efficiency Ratio)
Table shows the estimated hazard ratios of the hazard model estimation for bank failures (models (1)-(3)), for fire sales (models (4)-(6)), and acquisitions (models (7)-(9)).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	failed	failed	failed	fire sale	fire sale	fire sale	acquired	acquired	acquired
switch	1.490**	1.467**	1.448*	0.659*	0.641**	0.626**	0.680***	0.666***	0.677***
	(2.04)	(1.98)	(1.82)	(-1.87)	(-1.99)	(-2.06)	(-3.06)	(-3.22)	(-3.07)
size	1.142***	1.040	1.050	0.771***	0.692***	0.669***	1.082***	1.025	1.037
	(2.60)	(0.70)	(0.78)	(-4.74)	(-6.43)	(-6.87)	(3.64)	(0.99)	(1.40)
AGRconc(-1)	0.846***	0.919*	0.923	0.710***	0.777***	0.793***	0.992	0.996	1.000
	(-2.78)	(-1.66)	(-1.59)	(-6.09)	(-5.10)	(-4.86)	(-0.71)	(-0.36)	(0.00)
CNIconc(-1)	0.992	0.990	0.977	1.010	1.004	0.984	1.035***	1.034***	1.027***
	(-0.62)	(-0.73)	(-1.32)	(0.86)	(0.28)	(-0.91)	(4.79)	(4.66)	(3.67)
CONconc(-1)	0.678***	0.734***	0.755***	0.939	0.950	0.947	1.015***	1.014***	1.012**
	(-3.50)	(-3.19)	(-3.04)	(-0.96)	(-1.16)	(-1.23)	(2.64)	(2.59)	(2.11)
CREconc(-1)	1.035***	1.029***	1.025***	1.022***	1.013**	1.012*	1.021***	1.016***	1.013***
	(6.49)	(5.26)	(4.66)	(3.88)	(2.23)	(1.90)	(5.66)	(4.10)	(3.11)
RREconc(-1)	0.999	0.999	0.994	0.998	0.996	0.989	1.006	1.006	0.997
	(-0.04)	(-0.09)	(-0.40)	(-0.15)	(-0.28)	(-0.79)	(0.68)	(0.64)	(-0.28)
Loan/Assets(-1)	1.015**	1.017**	1.029***	0.992	0.993	1.001	0.987***	0.988***	0.991***
	(2.03)	(2.16)	(3.13)	(-1.56)	(-1.25)	(0.20)	(-4.12)	(-3.75)	(-2.65)
Securities/Assets(-1)	0.963***	0.969***	0.976***	0.962***	0.967***	0.972***	0.990***	0.991***	0.992***
	(-4.77)	(-3.79)	(-2.68)	(-8.25)	(-7.00)	(-5.67)	(-3.59)	(-3.02)	(-2.66)
Core/Total Deposits(-1)	0.972***	0.974***	0.975***	0.997	0.999	0.999	1.011***	1.010***	1.011***
	(-7.75)	(-6.94)	(-6.32)	(-0.74)	(-0.36)	(-0.22)	(4.47)	(4.12)	(4.41)
Efficiency Ratio(-1)	1.004	1.006	0.974	1.008**	1.007**	1.001	0.979	0.970	0.972
	(1.14)	(1.50)	(-1.44)	(2.27)	(2.16)	(0.13)	(-0.89)	(-1.07)	(-0.99)
Popln. level		1.187***	1.198***		1.181***	1.147***		1.071***	1.069***
		(4.14)	(4.16)		(6.13)	(4.59)		(4.57)	(4.04)
HHI		0.942	0.923		1.041	1.264		1.164	1.216
		(-0.08)	(-0.11)		(0.07)	(0.44)		(0.69)	(0.88)
Unempl. rate		1.133***	1.122***		1.047**	1.021		0.956***	0.944***
		(4.88)	(4.31)		(2.06)	(0.89)		(-3.13)	(-3.94)
GDP growth		1.141	1.130		0.780**	0.787*		0.928	0.903
		(0.50)	(0.45)		(-1.99)	(-1.87)		(-0.78)	(-1.05)
risk(StdDev)			1.130***			1.078***			1.010
			(8.46)			(5.94)			(0.39)
Subchapter-S Bank			0.780*			0.452***			0.676***
			(-1.91)			(-7.06)			(-7.69)
Rural Bank			1.323			0.811			1.027
			(1.07)			(-1.21)			(0.35)
Single Mkt Bank			1.191			1.003			1.237***
			(1.44)			(0.03)			(4.19)
pseudo R-squared	0.0862	0.0920	0.0982	0.0308	0.0354	0.0441	0.00318	0.00411	0.00609
Banks	8378	8378	8329	8378	8378	8329	8378	8378	8329
Observations	80925	80925	80718	80925	80925	80718	80925	80925	80718

***, **, * indicate statistical significance at the 1, 5, and 10% level.