

What Factors Explain Differences in Return on Assets Among Community Banks?

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Introduction

An important measure of bank profitability is return on assets (ROA). For banks with similar business risk profiles, pretax ROA is a useful statistic for comparing the profitability of banks because it avoids distortions that are introduced by differences in financial leverage and complications in the tax laws. We control for the differences in economic conditions among bank markets by focusing our analysis on community banks (CBs) that primarily operate in a single county.¹ Even among this select group of CBs, ROA displays wide variation both

across banks within a quarter and among banks over time. Figure 1 plots average and median ROAs, and the difference between the 90th percentile and the 10th percentile of the ROA distribution for community banks that primarily operate within a single individual county for each year between 1994 and 2011.² NBER-designated recession periods are indicated by gray shading. Figure 1 shows substantial variation in average CB ROAs over time, as well as large and variable differences between strong and weak performing CBs in each year of the sample.

¹ Community banks are banks that satisfy the 2012 FDIC community bank research definition criteria. <http://www.fdic.gov/regulations/resources/cbi/report/cbi-full.pdf>.

² Banks are included in this sample if they raised at least 75 percent of their deposits in a single county in a quarter. County deposit shares are estimated from FDIC Summary of Deposits (SOD) data, which are collected annually in June. In quarters between SOD reporting dates, SOD data are adjusted to reflect mergers and acquisitions. SOD data are only available electronically from 1994. Throughout this paper, ROA references are on a pretax basis.

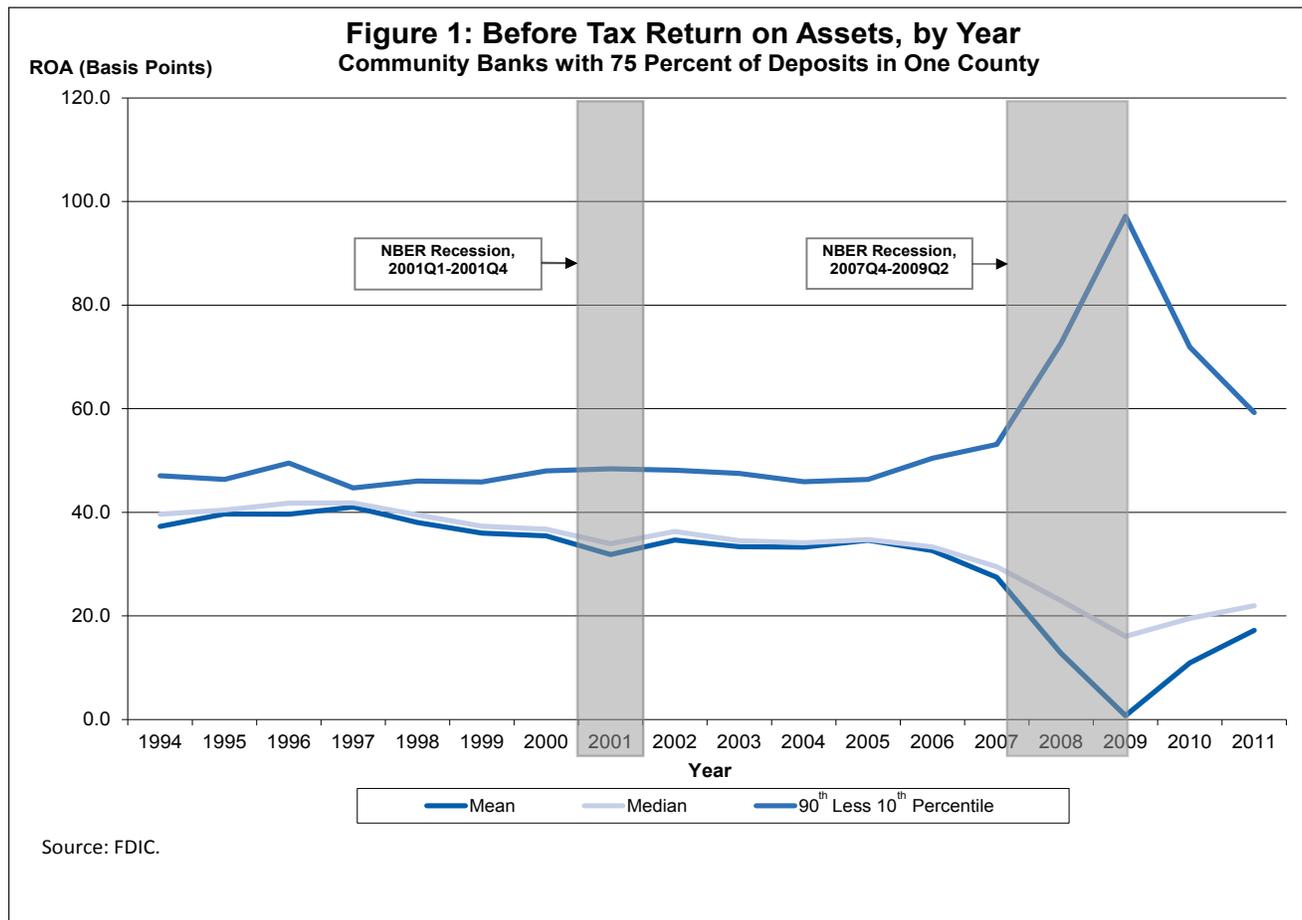
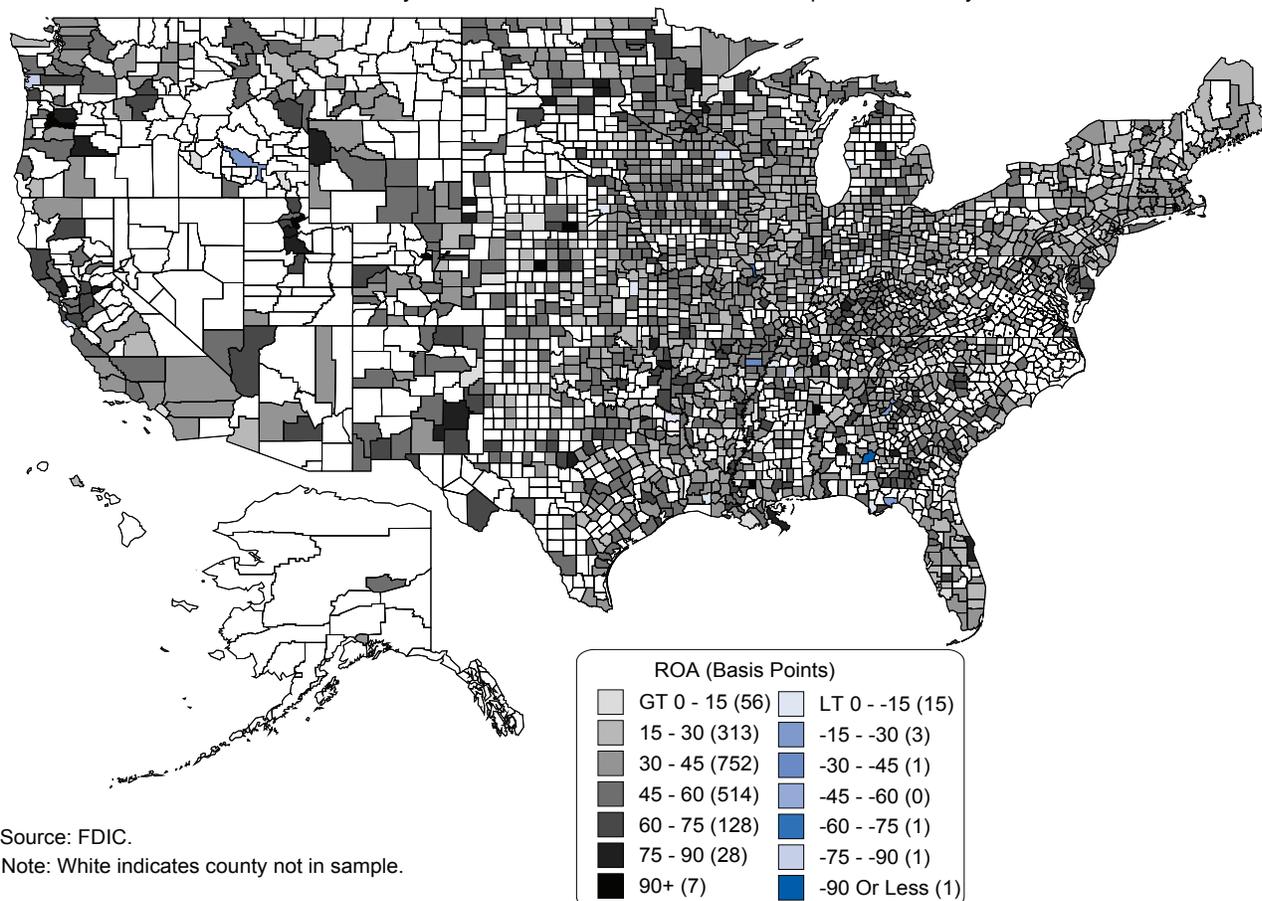


Figure 2: Average ROA by County, 2000Q2

Community Banks With at Least 75 Percent of Deposits in County



Source: FDIC.
Note: White indicates county not in sample.

Figure 1 suggests that economic conditions in local and national banking markets are certainly important determinants of CBs' ROAs. To explore this further, we examine performance in both benign and crisis periods. Figure 2 is a map of the 2000Q2 average bank ROA by county, where the county averages are for banks that raised at least 75 percent of their deposits in a single county in that quarter. On average, 2000Q2 was a profitable quarter for many community banks; only a few counties have average ROAs that are negative.

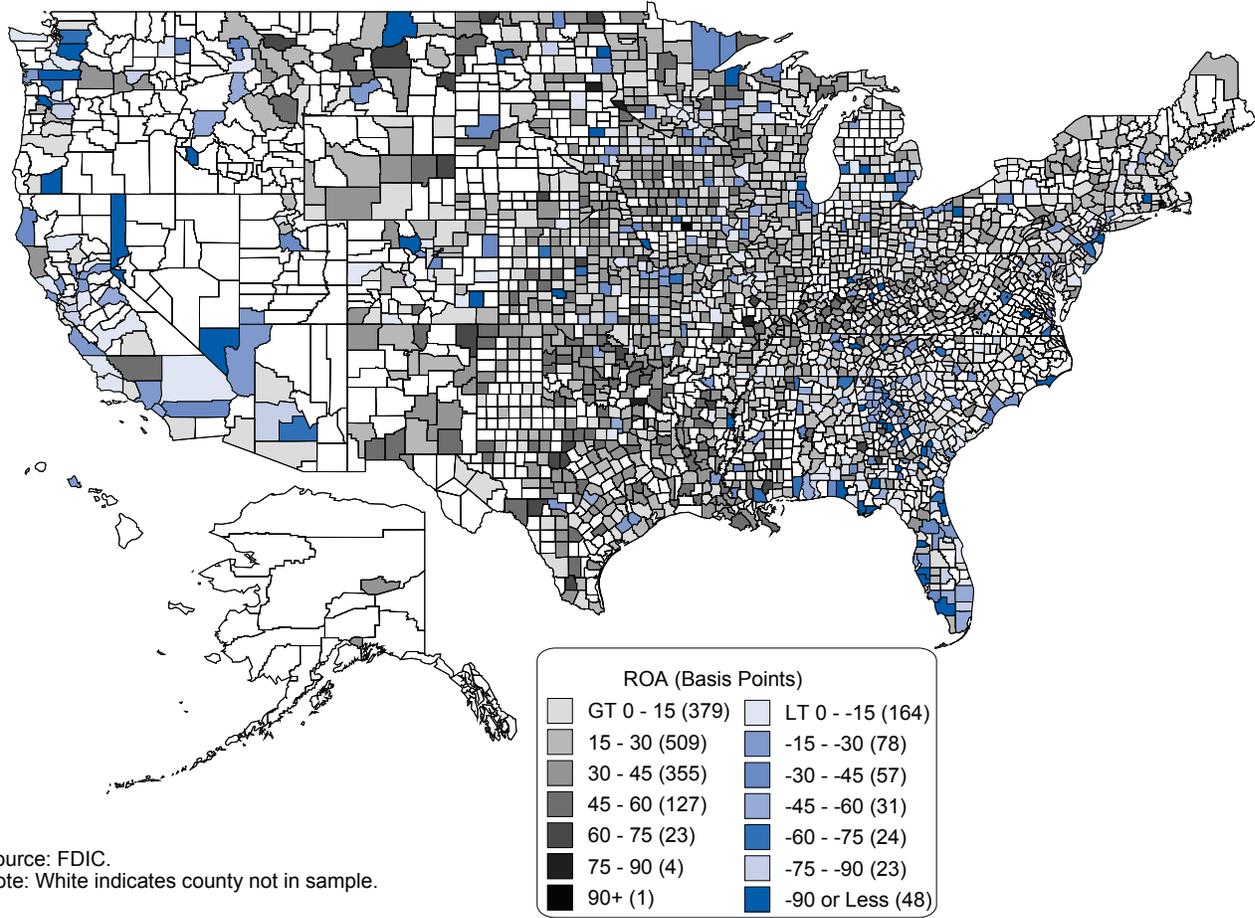
Figure 3 is a map of average bank ROA by county from the population of banks that raised at least 75 percent of their deposits in a single county in 2009Q2. In contrast to 2000Q2, 2009Q2 was a period of earnings stress for many community banks and a significant share of counties had negative average CB ROAs. Compared with 2000Q2, far fewer counties have average ROAs higher than 60 basis points. Among counties with positive average ROAs in 2009, relatively few were located near the coasts where

local market conditions deteriorated the most sharply. Figures 2 and 3 illustrate clear macro and regional economic patterns across time in banks' ROA data that must be accounted for when analyzing differences among CB bank ROA performance.

Identifying Factors that Explain ROA

Many studies that investigate bank profitability are concerned with distinguishing between the effects of market concentration and bank efficiency on profitability (see for example, Smirlock [1985] and Berger [1995]). A standard economic paradigm argues that concentration leads to market power, which then allows banks to set prices and increase profits. An alternative explanation for a positive relationship between profits and market concentration is that concentration is a consequence of superior efficiency, which is the true cause of increased profitability. Typically, these studies measure concentration using a Herfindahl-Hirschman Index (HHI) of bank deposits, and the market is defined as a Metropolitan Statistical Area

Figure 3: Average ROA by County, 2009Q2
Community Banks With at Least 75 Percent of Deposits in County



(MSA).³ Overall, these studies find that market concentration is associated with increased profitability; however, the underlying causality (market power or efficiency) is in dispute. Other studies focus on the macroeconomic and institutional forces that determine bank returns across countries (see for example, Demirguc-Kunt and Huizinga [1999]). These studies find a positive association between concentration, measured at the country level, and bank profitability.

In addition to the studies that focus on bank market power and profitability, Whalen (2001) and Hannan and Prager (2009) investigate whether the profitability of small community banks is affected by the presence of large multimarket financial institutions. Whalen studies these

effects using a sample of banks with total assets of \$500 million or less that have at least 67 percent of their deposits in an MSA, in the 1995 to 1999 period. Hannan and Prager (2009) study the issue using a sample of banks with assets of less than \$1 billion that derive at least 90 percent of their deposits from one MSA or non-MSA county, from 1996 to 2003. These studies find that the presence of multimarket financial institutions often lowers the profitability of community banks, but Hannan and Prager argue that this effect is only apparent in rural markets. Berger et al (2007) also finds this effect and posits that technological progress might be the driver of the multimarket bank effect.

While our methods are similar in some respects to Whalen (2001), Hannan and Prager (2009), and Berger et al (2007), we are primarily interested in distinguishing between the effects of management decisions and local economic conditions on the profitability of community banks. In order to identify true CB performance differences, we differentiate between factors that are within the control of a CB's management and factors that are mostly exogenous

³ The HHI is a commonly accepted measure of market concentration calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers. The HHI measures the relative size distribution of the firms in a market and takes a value closer to zero when a market has a large number of approximately equal-sized firms and a maximum value of 10,000 when a market is controlled by a single firm.

to the bank. For example, once a CB decides to locate in a particular area, for the most part, the economic conditions within its market area are exogenous factors that affect bank profitability. That is, in most situations it is probably reasonable to assume that a CB's operating behavior does not determine the economic conditions in its local market. While this scenario is possible in some unusual circumstances, we consider such cases to be exceptional, as our methodology necessarily assumes local market economic conditions are exogenous and not determined by the behavior of individual CBs.

To the extent that ROAs are generated by exogenous economic conditions, CBs' returns are attributable to the good luck of "being in the right place at the right time," and not to exceptional managerial skill. Still, among banks that face a favorable economic environment, some will perform better than others as a consequence of operational differences that are fully under the control of the CB's management. The ability to separate the component of bank returns that owe to good management decisions from those that are attributable to "luck" of location requires that we are able to identify the geographic market in which a CB operates and find variables that collectively provide good controls for the economic conditions that CBs face in their local markets.

In the analysis that follows, we use panel data regression techniques to identify the determinants of individual CB's ROAs. To control for macro economic conditions and demand for bank services in a CB's local market, we include in our analysis only community banks that undertake a majority of their business in a single market, which we define as a single county. While this sample selection criterion may not permit us to include some banks that operate primarily in large metropolitan areas that span multiple counties, it is necessary because we control for economic conditions using county-level economic statistics on the unemployment rate, the county house price growth rate, and the county delinquency rate on credit cards. We also control for quarterly time fixed effects.⁴

In addition to time variation in the economic environment, differences in bank ROA may also be attributed to differences in operational and business management choices, which may include bank underwriting standards,

⁴ Quarterly time fixed effects allow the overall average bank ROA within a quarter to vary quarter by quarter. The variation in average bank ROA could be caused by macroeconomic factors that vary each quarter (for example, aggregate GDP growth) and affect all bank's ROAs in a similar direction.

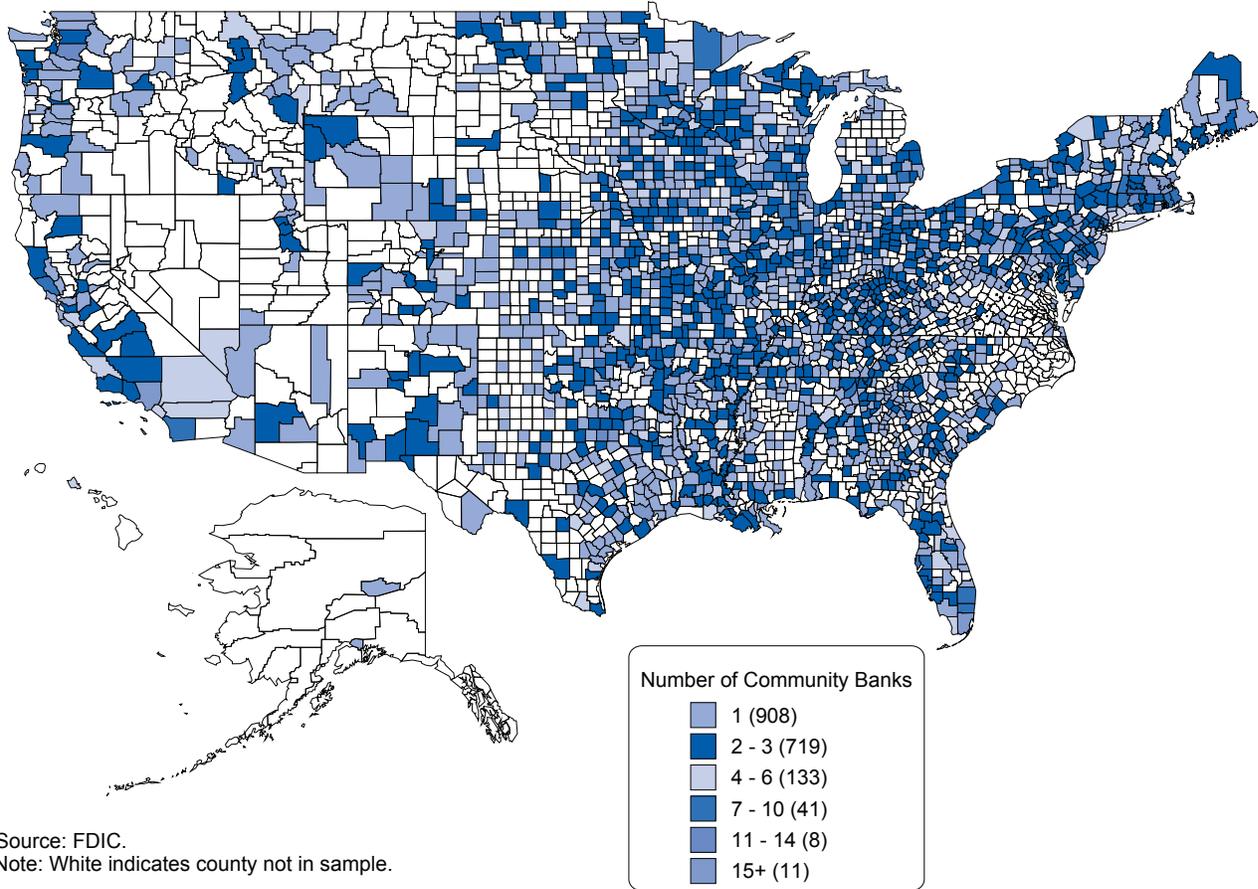
loan administration practices, loan growth, capital base, funding mix (including the use of noncore deposit funding), lending specializations, security investments, staffing and perhaps other factors that affect bank profitability. A bank's supervisory rating may also be correlated with its ROA. Over the longer term, ROA in the supervisory context is likely endogenous, meaning that the ratings take into account a bank's ROA along with other operating statistics and many other factors. In the short run, however, a bank's poor existing supervisory rating may be indicative of a limited ability to generate ROA, because these banks must take steps—which can often be costly—to improve the bank's condition, and may face operating restrictions or other requirements to implement remedial safety and soundness measures.

In order to control for local economic conditions that are assumed to be outside the control of bank managers, we select a sample of CBs whose markets are concentrated within a single county, within each quarter, and then control for quarterly measures of county and national level economic activity in a regression framework. We do so by estimating the share of deposits each CB raises in a county. County deposit shares are derived from annual FDIC SOD data, and county-level deposit share estimates for intervening quarters are estimated by merger-adjusting the prior June's SOD data over the following three quarters. Our data sample period begins when SOD data become available, 1994Q2, and ends in 2011Q4.

As a check of the robustness of our method for controlling for economic conditions, we select our CB sample using four different deposit share thresholds. In our largest sample, we select all CBs that raise at least 50 percent of their deposits within a single county. Three additional CB samples are pulled that increasingly focus on a single geographical area. In the second sample, a CB must raise at least 75 percent of its deposits within a single county to be included and identified with that county. The third and fourth samples use at least 90 percent and 100 percent as the respective county deposit share thresholds. The same estimation process is used for each of the four samples.

As our deposit share threshold for sample inclusion increases from 50 percent to 100 percent, we trade off reduced sample size for a collection of banks with a more focused geographical market that will better enable us to control for the economic conditions CBs face in their local markets. The sample size associated with a 50 percent deposit threshold is more than 414,000 CB-quarter obser-

Figure 4: Number of Sample Banks by County, 2000Q2
Community Banks With at Least 75 Percent of Deposits in County



variations, whereas a 100 percent deposit threshold reduces the sample size to about 238,000 CB-quarter observations (see Table 1, Summary Statistics).

For illustration, Figure 4 is a map of the number of CBs in each county that meet the 75 percent deposit share threshold using 2000 SOD data. Counties that include multiple banks that satisfy the threshold requirement tend to be concentrated in the Midwest, Northeast and mid-Atlantic, California, Florida, eastern Texas, and Washington. While the geographic characteristics of the sample changes with each annual SOD report, the geographic location of sample banks remains broadly consistent with the pattern in the 2000Q2 SOD data.

Explanatory Variables and Regression Model Specification

To control for market conditions in a CB's county, we include county-level unemployment rates, the share of credit card accounts within a county that are 60-days past

due, the county-level home price index, the county-level HHI for bank deposits as a measure of local competition among banks for deposits, and quarterly time fixed effects to account for national variation in macroeconomic factors.⁵ We expect unemployment and credit card delinquency rates to have negative effects on CB ROA and house price appreciation to have a positive effect. To the extent that concentration in deposit taking markets leads to market power in setting deposit rates and loan pricing, we expect the HHI concentration index to be positively related to bank ROA.⁶

⁵ Our county-level unemployment rate is from the U.S. Bureau of Labor Statistics. House price growth rates are based on Case Schiller indices adjusted for inflation using the consumer price index for consumers less shelter. For counties without reported house price index (HPI) values, we substitute the state HPI. County-level data on percentage of credit card accounts more than 60 days past due are from Trendata. Among our county-level economic controls, for the 50 percent SOD sample, we have unique county-level data for 100 percent of observations on credit card delinquency rates, for 76.6 percent of observations on unemployment data, and for only 30.2 percent of observations on HPI values; the remaining values are filled with state-level values. The county-level HHI is based on all bank deposits in the county.

⁶ This assumption that high HHI deposit concentration values may be an indication of monopoly powers is common in the bank market structure antitrust banking literature.

In addition to county-level controls for local bank market conditions, we include bank-specific characteristics that may also in part determine CB ROA outcomes. We group our discussion of bank-specific controls according to whether the control variables are related to past loan growth, supervision, scale properties that may be associated with bank efficiency, bank asset quality, bank funding characteristics, and the bank's investment portfolio characteristics.

To control for differences in historical growth rates, we include lagged loan growth as a bank-specific control. However, the expected sign of the lagged loan growth coefficient is not tightly predicted by theory. Banks should expand lending when they identify positive net present value lending projects, and so high loan growth might be expected to generate high future bank ROAs as new loans season. Nevertheless, some historical experience suggests that above-average loan growth can be a leading indicator of elevated bank risk. For example, loan growth may be facilitated by relaxed underwriting standards, new lending product offerings, or new loans to customers without established bank relationships. To the extent that above average loan growth is facilitated by such practices, high loan growth may lead to high future loan losses and reduced bank ROA. A third possibility is a negative relationship between high prior loan growth and ROA if banks expanded by growing low-margin, low-risk loans. The upshot is that links between loan growth and subsequent ROA performance can arise for any number of reasons, and further analysis is required to understand the underlying transmission mechanism.

We include CBs' leverage capital ratios in the ROA regression. While the Modigliani and Miller (1958) theorem suggests that ROA should be independent of bank capital structure, a bank's capital structure may affect its measured ROA in a number of ways. The first reason for including leverage in the regression is that a bank's measured ROA is typically defined as net earnings before tax, which includes a deduction for interest expenses, divided by average assets. This way of measurement means that ROA will be positively related to the bank regulatory leverage ratio.⁷ In addition to this measurement issue, bank leverage may be related to ROA for theoretical reasons. Because banks benefit from public safety nets, a large literature argues

⁷ This is because a higher bank leverage ratio implies less debt and lower interest expenses. While the text book definition of ROA is earnings before interest and taxes divided by assets, the convention is to use earnings before taxes, net of interest payments, divided by assets. This definition is used in the FDIC's *Quarterly Banking Profile*.

that weakly capitalized banks face incentives to magnify their risk-taking. In particular, weakly capitalized banks may enhance their profit by undertaking risky investments that offer high payoffs under the best of circumstances, but may generate losses under a wide variety of less positive economic conditions. To the extent that risk and return are positively related, this argument might suggest that banks with high leverage capital ratios (high equity-to-asset ratios) will invest in safer assets and have smaller ROAs on average. On the other hand, banks may maintain high equity buffers to protect profitable franchises and maintain lending capacity. Banks with high ROAs and potentially many profitable investment opportunities may decide to maintain high leverage ratios to maintain the capacity for profitable future growth. To summarize, economic theory does not uniquely predict the sign of the relationship between ROA and a CB's leverage ratio.

In addition to a bank's leverage ratio, we include dummy variables that indicate whether a bank is entering the period with a poor supervisory CAMELS rating.⁸ At the conclusion of an on-site examination, supervisors assign a bank a CAMELS grade of 1 to 5, where 1 represents an exceptionally well-run institution (from a supervisory perspective) while 5 identifies an institution with serious safety and soundness deficiencies. By statute, small community banks must be examined at least every 18 months, and so CAMELS ratings may be up to 18 months old for some banks in some data quarters.⁹ To account for potential ROA implications of a poor supervisory rating, we include separate dummy variables that indicate whether a bank's CAMELS rating was 3, or 4 or 5 in quarters prior to the quarter in which we measure ROA. Because of the related costs that may be required to remedy problem assets and other operational problems, to upgrade risk management systems and practices, and to implement

⁸ Under the Uniform Financial Institutions Rating System (adopted by the Federal Financial Institutions Examination Council), each financial institution is assigned a composite rating based on an evaluation of six financial and operational components, which are also rated. These six components are: capital adequacy, asset quality, management capabilities, earnings sufficiency, liquidity position, and sensitivity to market risk. These component ratings are commonly referred to by their acronym, CAMELS. A bank's composite rating generally bears a close relationship to its component ratings. However, the composite rating is not derived by averaging the component rating. When assigning a composite rating, some components may be given more weight than others depending on the situation at the institution. In general, assignment of a composite rating may incorporate any factor that bears significantly on the condition of the financial institution.

⁹ We emphasize the temporal relationship between a CAMELS rating and the regression-dependent variable to stress that the bank's CAMELS rating is not endogenous in the ROA regression model specification.

other remedial measures, and because of the constraints that may be placed on banks experiencing problems, we expect poor CAMELS ratings to be associated with lower bank ROA.

We include the ratios of loans 30-89 days past due to bank assets and noncurrent loans (those 90 days or more past due or on nonaccrual) to bank assets as measures of bank asset quality. We expect these two variables to have a negative effect on bank ROA. We also include the standard deviation of a bank's charge-off rate over the lagging eight quarters as a sample-based measure of the riskiness of a bank's loan portfolio. If risk and expected return are positively related, and this variable is a proxy for bank loan portfolio risk, we might expect this variable to have a positive sign in the regression.

We also include a bank's average cost of funds (specifically the cost of funds-to-liabilities ratio), the ratio of its brokered deposits-to-assets, and its ratio of noncore funds-to-assets, to control for a bank's liability structure. We expect all these funding variables to be negatively related to a bank's ROA. In addition to controlling for CBs' cost of funds, we also control for banks' efficiency ratios. The efficiency ratio is defined as the ratio of noninterest expenses to revenues. High efficiency ratios suggest that a bank may be having difficulties controlling its noninterest costs and so we expect ROA to be negatively associated with bank efficiency ratios.

To control for potential economies of scale in community banks, we include the average value of deposits per bank branch, the average number of employees needed to manage a dollar of assets, bank size, size squared, size cubed and size to the fourth power, where bank size is measured by bank assets.¹⁰ If community banks have important economies of scale, potentially we might find a positive coefficient on average deposits per branch, a negative coefficient of the number of employees used to manage a dollar of bank assets, and a positive coefficient on bank size, with a negative coefficient on the square of bank size under the anticipation that the marginal benefits of scale decline as the size of the bank increases.¹¹

Finally, we include a number of bank-specific variables to measure the importance of a bank's mix of loans and other

investments in determining its ROA. We control for a bank's total security-to-assets ratio and its total loans-to-assets ratio. We expect both of these variables to have a positive effect on bank ROA. Differences in a bank's lending concentrations are measured by including the CBs' commercial and industrial (C&I) loans-to-assets ratio, consumer loans-to-assets ratio, commercial real estate (CRE) loans-to-assets ratio, construction and land develop-

Fixed Effect Estimation and CB Economies of Scale

Important estimation bias may be created when an important causal factor is omitted from a regression model. When the explanatory variables in the model are correlated with the omitted variable, the coefficient estimate of the variable included in the model will reflect both its own effect and the effects of the omitted factor. This bias is called "omitted variable bias."

The omitted variable problem is common in situations where the data set is repeated observations on cross-sections of individuals (e.g., families, firms, banks) over time—so called panel data. In this paper, we use data on individual CBs followed over time. One possible way to remove omitted variable bias in panel data is to change the regression model so that it allows each CB to have its own intercept term. The bank-specific intercept will measure differences across banks' ROA that do not vary over time. Since this method controls for "time-invariant" differences among banks, it is called a "fixed effect estimator," and it controls for omitted explanatory variables that are not expected to change over the sample period, such as a CB's management risk-taking preferences or its credit underwriting culture.

The use of bank fixed effects, while fully appropriate for our CB ROA analysis, creates an interpretation issue when we measure the importance of economies of scale. To better understand this issue, recall that in a simple regression model, the model coefficient estimates ensure that the regression line goes through the sample mean values. For example, if y is the dependent variable, X is the vector of independent variables, β is the vector of the independent variable coefficients, α is the model intercept, and ε is a vector of residuals, the regression model is,

$$y = \alpha + \beta X + \varepsilon.$$

The regression model coefficient estimates $(\hat{\alpha}, \hat{\beta})$ will

¹⁰ Each scale measure uses assets measured in millions of constant dollars (base year 2000).

¹¹ Size-cubed and the fourth power of size are included to allow for a flexible shape to the functional form that measures scale economies.

always ensure that the regression line goes through the sample mean values,

$$\bar{y} = \hat{\alpha} + \hat{\beta} \bar{X}$$

From this relationship, it is easy to see the impact of a change in the independent variable values. If, for example, X takes on a value that is ΔX larger than the sample mean value \bar{X} , then the dependent variable y will have a value that is $(\hat{\beta} \cdot \Delta X)$ larger than \bar{y} .

When bank fixed effects are introduced, the regression model coefficient estimates will ensure that the regression line goes through the sample averages for each bank. In other words, the regression model coefficient estimates will require

$$\bar{y}_i = \hat{\alpha}_i + \hat{\beta} \bar{X}_i$$

for bank i , and,

$$\bar{y}_j = \hat{\alpha}_j + \hat{\beta} \bar{X}_j$$

for bank j .

A consequence of this different restriction on the regression line is that the interpretation of the impact of a change in the value of the independent variables is now slightly different.

When the model includes fixed effects, if we increase each bank's independent variables by ΔX over its individual sample mean values of \bar{X}_i and \bar{X}_j , then bank's respective dependent variables values are each expected to increase by $(\hat{\beta} \cdot \Delta X)$ relative to their individual mean values \bar{y}_i and \bar{y}_j , which are generally different across banks when fixed effects are used to control for omitted unobserved factors. This difference of interpretation is important because we cannot use the coefficient estimates from the fixed effect estimator to establish an overall optimal bank size to maximize CB ROA. Instead, our estimates tell us how bank ROA will increase with bank size relative to each bank's average sample size. And so the fixed effects model estimates tell us whether a bank's ROA can be improved by growing larger than its own sample average size, but they do not tell us a single bank size that is optimal for all banks.

ment (C&D) loans-to-assets ratio, and residential real estate loans-to-assets ratio. Because the banks' overall loans-to-assets ratio is included in the regression, the specialty loan concentration coefficients measure the differences between the ROA on a specific loan specialization relative to the ROA effect for nonspecialized lending.

For example, the ROA effect of C&D lending is the sum of the coefficients on the bank's loans-to-assets ratio and its C&D loans-to-assets ratio.

The regression model is of the form:

$$\begin{aligned} ROA_{it} = & \alpha_i + \sum_{q=1}^T \zeta_q Q_q + \sum_{h=1}^H \delta_h Markt_{iht} + \beta loan\ growth_{it-1} \\ & + \sum_{j=1}^J \gamma_j Sup_{jit-1} + \sum_{l=1}^L \eta_l AQual_{ilt-1} \\ & + \sum_{m=1}^M \kappa_m Fun_{imt-1} + \sum_{n=1}^N \lambda_n Scale_{int} + \sum_{p=1}^P \mu_p ACon_{pit-t} + \tilde{\epsilon}_{it} \end{aligned}$$

where α_i is a bank-specific constant; $Q_q, \{q=1, 2, \dots, T\}$ are T quarterly fixed effect dummy variables; $Markt_{iht}, \{h=1, 2, \dots, H\}$ are H factors that capture economic conditions in bank i 's primary deposit-taking county at time t ; $loangrowth_{it-1}$ is bank i 's loan growth during period $t-1$; $Sup_{jit-1}, \{j=1, 2, \dots, J\}$ are J supervisory factors for bank i at date $t-1$ (e.g., Tier 1 leverage ratio and CAMELS dummies); $AQual_{ilt-1}, \{l=1, 2, \dots, L\}$ are L factors that measure bank i 's asset quality at time t ; $Fun_{imt-1}, \{m=1, 2, \dots, M\}$ are factors that measure bank i 's funding characteristics at date t ; $Scale_{int}, \{n=1, 2, \dots, N\}$ are N factors associated with bank i 's scale economies at date t ; $ACon_{ip-t}, \{p=1, 2, \dots, P\}$ and are P factors that measure bank i 's asset portfolio composition at date t . $\tilde{\epsilon}_{it}$ is the regression error term for bank i at time t .

The regression model includes bank fixed effects to control for important time-invariant bank-specific omitted variables that may determine ROA. One example of an important omitted variable is the bank management's preferences for risk and return. The fixed effect estimation methodology corrects for this omission provided banks' risk preferences are unchanging over time. Time-varying bank-specific factors are lagged one quarter to minimize endogeneity.

Sample Characteristics and Empirical Results

Before selecting our four samples using the share of deposit thresholds in a single county, the data are adjusted to remove uncharacteristic institutions and outlier observations. We excluded institutions with no lending, and credit card banks, de novo and foreign banks.¹² We also excluded observations with missing data and observations with

¹² We define de novo banks as banks newly chartered in the past seven years. It is well-known that de novo loan growth and earnings patterns are substantially different from mature institutions.

outlier or implausible values.¹³ Sample summary statistics for each of the four samples, by county deposit threshold, appear in Table 1.

The regression results appear in Table 2, where the coefficient estimates are separated using shaded or white groupings to identify control variables associated with similar function, i.e., those that measure local market economic conditions, supervisory effects, asset quality factors, etc. The columns in Table 2 report regression results for the four different bank samples. In the column labeled “50,” the sample includes all CBs with 50 percent or more of their deposits raised in a single county. In the column labeled “75,” estimates are for the sample of CBs that raised at least 75 percent of their deposits in a single county. The columns labeled “90” and “100” include estimates based on samples in which at least 90 percent or 100 percent of bank deposits were raised in a single county.

The regression model estimates are, for the most part, very similar across the different county share deposit thresholds.¹⁴ While the 100 percent sample ensures that banks face, as near as possible, identical local market conditions, banks in the 50 percent sample react similarly to the variables that control for county-level economic conditions. Across the samples, the county-level unemployment rate and credit card delinquency rate are both negative and statistically significant determinants of bank ROA. County-level house price appreciation is positive and statistically significant. The county’s HHI index for bank deposits, however, while positive across samples, is significant for only the 50 percent sample.

Above-average bank loan growth in prior quarters is negatively associated with bank ROA. We have estimated specifications with additional loan growth lags up to one year (results not reported) with similar results. Above-average loan growth on average has negative implications for future bank ROA. The negative loan growth result could

¹³ The data quality filter excluded observations with: reported loans-to-assets ratios less than 0 or greater than 100 percent; negative reported cost of funds; negative reported capital ratios; negative reported employees or an extremely large number of employees relative to an institution’s size; share of deposit data values that were grossly inconsistent with the institution’s call report data and other similar screens. We also exclude institutions in the top 5 percent of capital ratios for the quarter, among all Call Report filers, to further eliminate banks that do not primarily focus on lending. Last, consistent with the methodology of the *Uniform Bank Performance Report*, we drop institutions in the bottom and top 5 percent in loan growth values, among all institutions, for each quarter.

¹⁴ Standard errors are clustered at the county level to relax the assumption of independence across banks in the same county.

be consistent with a number of explanations. One possible explanation is that underwriting standards are relaxed to achieve higher growth. An alternative explanation might be that high-growth banks expand into lower margin lending businesses without taking on higher-risk loans. The panel regression analysis does not distinguish among these or other possible explanations.

Tier 1 leverage ratios are negative and statistically significant, indicating that higher leverage ratios are associated with smaller bank ROAs. This result is consistent with better capitalized banks on average investing in lower-risk assets. The regression results also show that an existing supervisory CAMELS composite rating of 3, or 4 or 5 is negative and statistically significant. An existing CAMELS composite rating of 4 or 5 is, on average, associated with an ROA that is more than 22 basis points smaller than a CAMELS 1 or 2 rated bank.

Asset quality is an important determinant of bank ROA. Two measures of asset quality, past-due and noncurrent loans, are both negative and statistically significant. This suggests that, controlling for economic factors, solid underwriting and loan administration practices favorably affect ROA. The standard deviation of bank charge-off rates over the past eight quarters is negative, but statistically significant for only the 50 percent sample. From this analysis, it is difficult to interpret the meaning of the charge-off volatility coefficient estimate. Since it is only significant for the 50 percent sample, it may be a proxy for omitted factors that measure economic conditions in the more geographically diverse markets in which these banks operate.

The variables that measure bank funding characteristics are negative and statistically significant. Not surprisingly, after controlling for other factors, on average, having a higher cost of funds-to-total liabilities ratio is associated with lower bank ROA. Other things equal, a 1 percentage point increase in a bank’s average cost of funds is associated with almost a 40 basis point decline in bank ROA. The use of brokered deposits is statistically significant and associated with lower bank ROA across all the samples, while the coefficients on the noncore-funds-to-assets ratio are negative, but gain significance only for the more geographically concentrated sample banks.

The variables that measure the potential for scale economies suggest that larger scale is associated with improved ROA. Higher average deposits per branch result in small

Table 1: Summary Statistics

Variable	50% of Deposits in County				75% of Deposits in County				90% of Deposits in County				100% of Deposits in County			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Before Tax Return-on-Assets, 1-Qtr Lag (Basis Points)	29.4	36.3	-1,817	1,346.7	29.7	36.3	-1,817	1,346.7	29.9	36.2	-1,817	1,346.7	30.0	36.3	-1,817	1,164.9
Quarter-to-Quarter Loan Growth (Pct)	1.5	4.3	-11.3	18.8	1.5	4.4	-11.3	18.8	1.5	4.4	-11.3	18.8	1.5	4.5	-11.3	18.8
=1 if Composite Rating = 3, 1-Qtr Lag	0.07	0.26	0	1	0.07	0.25	0	1	0.06	0.25	0	1	0.06	0.25	0	1
=1 if Composite Rating = 4 or 5, 1-Qtr Lag	0.02	0.15	0	1	0.02	0.15	0	1	0.02	0.14	0	1	0.02	0.14	0	1
Leverage Capital Ratio, 1-Qtr Lag (Pct)	9.9	2.7	0.2	26.1	10.1	2.7	0.2	26.1	10.2	2.8	0.4	26.1	10.3	2.8	0.4	26.1
Past Due-to-Assets, 1-Qtr Lag (Pct)	0.9	1.0	0	59.9	1.0	1.0	0	59.9	1.0	1.0	0	59.9	1.0	1.0	0	59.9
Non-current-to-Assets, 1-Qtr Lag (Pct)	0.8	1.3	0	35.5	0.8	1.3	0	35.5	0.8	1.2	0	35.5	0.8	1.2	0	26.6
Charge-off Rate, 8-Quarter Standard Deviation, 1-Qtr Lag (Pct)	0.1	0.2	0	14.0	0.1	0.2	0	14.0	0.1	0.2	0	14.0	0.1	0.2	0	14.0
Cost of Funds-to-Liabilities, 1-Qtr Lag (Pct)	0.7	0.3	0	5.1	0.7	0.3	0	5.1	0.7	0.3	0	5.1	0.7	0.3	0	5.1
Brokered Deposits-to-Assets, 1-Qtr Lag (Pct)	1.5	4.8	0	88.2	1.5	4.9	0	88.2	1.5	4.9	0	88.2	1.4	4.8	0	88.2
Noncore Funds-to-Assets, 1-Qtr Lag (Pct)	18.3	10.2	0	92.5	18.0	10.3	0	92.5	17.7	10.3	0	92.5	17.4	10.2	0	92.5
Total Assets (2000 \$Millions)	\$178	\$297	\$1	\$11,810	\$154	\$246	\$1	\$10,204	\$131	\$191	\$1	\$10,204	\$111	\$141	\$1	\$8,480
Average Deposits Per Branch in County (2000 \$Millions)	39.2	38.9	1.1	5,310.3	38.8	38.3	1.1	5,310.3	37.8	36.7	1.1	5,310.3	36.7	34.1	1.1	1,182.6
Number of Employees-to-Assets (2000 \$Millions), 1-Qtr Lag	0.39	0.15	0.004	8.3	0.38	0.15	0.004	8.3	0.38	0.15	0.004	4.6	0.38	0.15	0.004	4.6
Efficiency Ratio, 1-Qtr Lag (Pct)	68.3	32.4	-3,432.4	12,454.6	68.1	33.6	-3,432.4	12,454.6	68.0	34.3	-3,432.4	12,454.6	68.0	35.6	-3,432.4	12,454.6
Securities-to-Assets, 1-Qtr Lag (Pct)	22.6	13.1	-44.4	93.4	23.1	13.3	-2.2	93.4	23.4	13.5	-2.2	93.4	23.5	13.6	-2.2	93.4
Total Loans-to-Assets, 1-Qtr Lag (Pct)	65.2	13.0	1.7	99.0	64.6	13.2	1.7	99.0	64.2	13.4	1.7	99.0	63.9	13.5	1.7	99.0
Consumer Loans-to-Assets, 1-Qtr Lag (Pct)	6.2	5.9	0	82.1	6.2	6.0	0	82.1	6.3	6.0	0	82.1	6.4	6.1	0	82.1
Commercial & Industrial Loans-to-Assets, 1-Qtr Lag (Pct)	9.0	7.2	0	83.7	9.0	7.2	0	83.7	9.0	7.3	0	83.7	8.9	7.3	0	83.7
Construction & Land Development Loans-to-Assets, 1-Qtr Lag (Pct)	4.5	6.3	0	95.7	4.3	6.2	0	95.7	4.2	6.1	0	95.7	4.0	6.0	0	95.7
Commercial Real Estate Loans-to-Assets, 1-Qtr Lag (Pct)	12.8	10.1	0	87.3	12.4	10.0	0	87.3	12.1	9.9	0	87.3	11.7	9.8	0	87.3
Residential Real Estate Loans-to-Assets, 1-Qtr Lag (Pct)	22.8	16.2	0	97.5	22.8	16.2	0	97.5	22.6	16.2	0	97.5	22.5	16.4	0	96.5
County Unemployment Rate (Pct)	5.7	2.5	0.6	37.5	5.7	2.5	0.6	37.5	5.6	2.5	0.7	37.5	5.6	2.5	0.7	37.5
County Credit Card 60 Days DQ Rate (Pct)	2.6	1.3	0	100	2.6	1.3	0	100	2.6	1.3	0	100	2.6	1.3	0	100
County HPI Growth Rate (Pct)	0.1	2.4	-21.3	19.0	0.1	2.4	-21.3	19.0	0.1	2.4	-21.3	19.0	0.1	2.4	-21.3	19.0
County Deposit Share HHI	0.21	0.13	0.03	1	0.21	0.13	0.03	1	0.20	0.13	0.03	1	0.20	0.13	0.03	1
Share of Total SOD Deposits in County, for Cert	0.90	0.15	0.50	1.00	0.96	0.07	0.75	1.00	0.99	0.02	0.90	1.00	1.00	0.00	1.00	1.00
Share of Branches in County, for Cert	0.82	0.23	0.06	1.00	0.90	0.17	0.07	1.00	0.97	0.10	0.07	1.00	1.00	0.02	0.33	1.00
Total Number of Branches, for Cert	4.2	4.4	1	160	3.5	3.5	1	68	3.0	2.7	1	47	2.6	2.1	1	31
N	414,843				333,148				270,598				238,122			

Table 2: OLS Estimates, Quarterly Before Tax Return on Assets (in Basis Points)

County Percent SOD Share	50	75	90	100
Qtr-to-Qtr Loan Growth, 1-Qtr Lag (Pct)	-0.11*** (0.02)	-0.10*** (0.02)	-0.11*** (0.03)	-0.10*** (0.03)
=1 if Composite Rating = 3, 1-Qtr Lag	-8.59*** (0.48)	-8.34*** (0.53)	-8.26*** (0.60)	-8.22*** (0.66)
=1 if Composite Rating = 4 or 5, 1-Qtr Lag	-24.83*** (1.34)	-24.08*** (1.54)	-22.80*** (1.69)	-22.61*** (1.83)
Leverage Capital Ratio, 1-Qtr Lag	-0.22*** (0.08)	-0.31*** (0.10)	-0.38*** (0.10)	-0.41*** (0.11)
Past Due Loans to Assets, 1-Qtr Lag (Pct)	-1.80*** (0.18)	-1.82*** (0.20)	-1.88*** (0.20)	-1.87*** (0.20)
Non-current Loans to Assets, 1-Qtr Lag (Pct)	-6.36*** (0.21)	-6.24*** (0.24)	-6.17*** (0.27)	-6.00*** (0.28)
Charge-off Rate Standard Deviation over 8-Qtrs (Pct)	-1.72** (0.84)	-0.98 (0.92)	-0.77 (1.00)	-0.34 (1.05)
Cost of Funds to Liabilities, 1-Qtr Lag (Pct)	-38.08*** (1.44)	-38.92*** (1.57)	-39.52*** (1.76)	-39.39*** (1.71)
Brokered Deposits to Assets, 1-Qtr Lag (Pct)	-0.33*** (0.04)	-0.31*** (0.05)	-0.32*** (0.06)	-0.26*** (0.06)
Noncore Funds to Assets, 1-Qtr Lag (Pct)	-0.02 (0.02)	-0.04 (0.02)	-0.05* (0.03)	-0.07** (0.03)
Efficiency Ratio, 1-Qtr Lag (Pct)	-0.06** (0.03)	-0.06* (0.03)	-0.05 (0.03)	-0.04 (0.03)
Assets (2000 \$Mills)	0.00 (0.00)	0.01 (0.00)	0.01*** (0.00)	0.02*** (0.01)
Assets (2000 \$Mills), 2nd Order	-0.00 (0.00)	-0.00 (0.00)	-0.00*** (0.00)	-0.00** (0.00)
Assets (2000 \$Mills), 3rd Order	0.00* (0.00)	0.00 (0.00)	0.00** (0.00)	0.00* (0.00)
Assets (2000 \$Mills), 4th Order	-0.00* (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00 (0.00)
Avg Deposits Per Branch in County (2000 \$Mills)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)
Number of Employees to Assets (2000 \$Mills), 1-Qtr Lag (Pct)	-19.20*** (2.81)	-22.16*** (3.25)	-24.92*** (3.55)	-27.97*** (3.55)
Securities-to-Assets, 1-Qtr Lag (Pct)	0.43*** (0.02)	0.43*** (0.02)	0.43*** (0.03)	0.43*** (0.03)
Total Loans-to-Assets, 1-Qtr Lag (Pct)	0.78*** (0.03)	0.76*** (0.04)	0.76*** (0.04)	0.76*** (0.04)
Consumer Loans-to-Assets, 1-Qtr Lag (Pct)	-0.16*** (0.04)	-0.16*** (0.05)	-0.17*** (0.06)	-0.18*** (0.06)
Commercial and Industrial Loans-to-Assets, 1-Qtr Lag (Pct)	-0.09** (0.03)	-0.09** (0.04)	-0.08* (0.05)	-0.06 (0.05)
Construction and Land Develop. Loans-to-Assets, 1-Qtr Lag (Pct)	-0.13*** (0.04)	-0.09* (0.05)	-0.08 (0.06)	-0.07 (0.06)
Commercial Real Estate Loans-to-Assets, 1-Qtr Lag (Pct)	-0.06* (0.03)	-0.06* (0.03)	-0.04 (0.04)	-0.03 (0.04)
Residential Real Estate Loans-to-Assets, 1-Qtr Lag (Pct)	-0.09*** (0.03)	-0.09** (0.04)	-0.09** (0.04)	-0.08* (0.04)
County Unemployment Rate (Pct)	-0.69*** (0.07)	-0.72*** (0.08)	-0.74*** (0.09)	-0.73*** (0.09)
County Credit Card 60 Days DQ Rate (Pct)	-0.81*** (0.14)	-0.81*** (0.15)	-0.92*** (0.18)	-0.81*** (0.18)
County HPI Growth Rate (Pct)	0.38*** (0.05)	0.35*** (0.05)	0.31*** (0.06)	0.28*** (0.06)
County Deposit Share HHI	5.17*** (1.96)	3.72 (2.62)	4.84 (2.96)	4.89 (3.21)
Constant	-8.92** (3.84)	-6.45 (4.24)	-4.79 (4.53)	-4.90 (4.55)
Bank Fixed Effects	Y	Y	Y	Y
Quarterly Fixed Effects	Y	Y	Y	Y
Cluster By County	Y	Y	Y	Y
N	414843	333148	270598	238122
R-sq	0.44	0.44	0.45	0.45

Table 2: OLS Estimates, Quarterly Before Tax Return on Assets (in Basis Points) (Continued)

County Percent SOD Share	50	75	90	100
F-Statistic for Test:				
C&I = Construction & Land Dev (CLD)	0.7	0.0	0.0	0.0
Prob > F =	0.39	0.96	0.91	0.90
Comm Real Estate (RE) = Res RE	0.9	1.0	1.7	1.0
Prob > F =	0.34	0.33	0.19	0.31
CLD = Res RE	0.9	0.0	0.1	0.0
Prob > F =	0.33	0.92	0.79	0.89

Note: Robust standard errors in parentheses; * p <0.10, ** p<0.05, ***p<0.01
Source: FDIC.

Table 3: OLS Estimates, Quarterly Before Tax Return on Assets (in Basis Points) With Pre-Crisis and Crisis Interactions

	County Percent SOD Share			
	50	75	90	100
Total Loans-to-Assets, 1-Qtr Lag (Pct)	0.82*** (0.03)	0.81*** (0.04)	0.81*** (0.04)	0.81*** (0.04)
Consumer Loans-to-Assets, 1-Qtr Lag (Pct)	-0.19*** (0.04)	-0.20*** (0.05)	-0.22*** (0.06)	-0.22*** (0.06)
Commercial and Industrial Loans-to-Assets, 1-Qtr Lag (Pct)	-0.09*** (0.03)	-0.08** (0.04)	-0.09* (0.05)	-0.06 (0.05)
Construction and Land Develop. Loans-to-Assets, 1-Qtr Lag (Pct)	0.21*** (0.04)	0.22*** (0.05)	0.23*** (0.06)	0.24*** (0.06)
Commercial Real Estate Loans-to-Assets, 1-Qtr Lag (Pct)	-0.00 (0.03)	-0.01 (0.03)	0.01 (0.04)	0.03 (0.04)
Residential Real Estate Loans-to-Assets, 1-Qtr Lag (Pct)	-0.08** (0.03)	-0.10*** (0.04)	-0.10** (0.04)	-0.09** (0.04)
Consumer Loans-to-Assets, 1-Qtr Lag (Pct) *=1 if Year GE 2008	0.11* (0.06)	0.13* (0.07)	0.13** (0.07)	0.12* (0.07)
Commercial and Industrial Loans-to-Assets, 1-Qtr Lag (Pct) *=1 if Year GE 2008	-0.16*** (0.05)	-0.20*** (0.05)	-0.17*** (0.06)	-0.16*** (0.06)
Construction and Land Develop. Loans-to-Assets, 1-Qtr Lag (Pct) *=1 if Year GE 2008	-1.26*** (0.06)	-1.26*** (0.08)	-1.26*** (0.09)	-1.28*** (0.10)
Commercial Real Estate Loans-to-Assets, 1-Qtr Lag (Pct) *=1 if Year GE 2008	-0.13*** (0.03)	-0.11*** (0.04)	-0.11*** (0.04)	-0.13*** (0.05)
Residential Real Estate Loans-to-Assets, 1-Qtr Lag (Pct) *=1 if Year GE 2008	0.03* (0.01)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)
Other Baseline Controls	Y	Y	Y	Y
Bank Fixed Effects	Y	Y	Y	Y
Quarterly Fixed Effects	Y	Y	Y	Y
Cluster by County	Y	Y	Y	Y
N	414843	333148	270598	238122
R-sq	0.44	0.45	0.45	0.46

Note: Robust standard errors in parentheses; * p <0.10, ** p<0.05, ***p<0.01
Source: FDIC.

incremental increases in ROA and more assets per employee also improve ROA. Both of these effects are statistically significant. For the smaller, more geographically concentrated banks of the 90 percent and 100 percent deposit share samples, the coefficient estimates for bank assets and higher powers of bank assets are statistically significant. The coefficient on assets is positive while the squared term is negative, indicating positive economies of scale that diminish as bank size increases. We will examine the economies of scale relationship in more detail below. The coefficients on the efficiency ratio are negative, but statistically significant for only the two less geographically concentrated samples.

Variables that measure differences in CB investment portfolios are also statistically significant, indicating that they can help explain differences in CBs' ROA outcomes. On average, CB loans produced higher ROAs compared with CB security holdings. The coefficient on the loans-to-assets ratio is close to twice as large as the coefficient on the securities-to-assets ratio. Among the measures of loan specializations, on average over the entire sample period, controlling for local and national banking market conditions, all CB specialty lending categories experienced lower ROAs compared with uncategorized CB lending. Estimates suggest that the negative return component associated with C&I, C&D, and CRE lending diminishes as a bank's

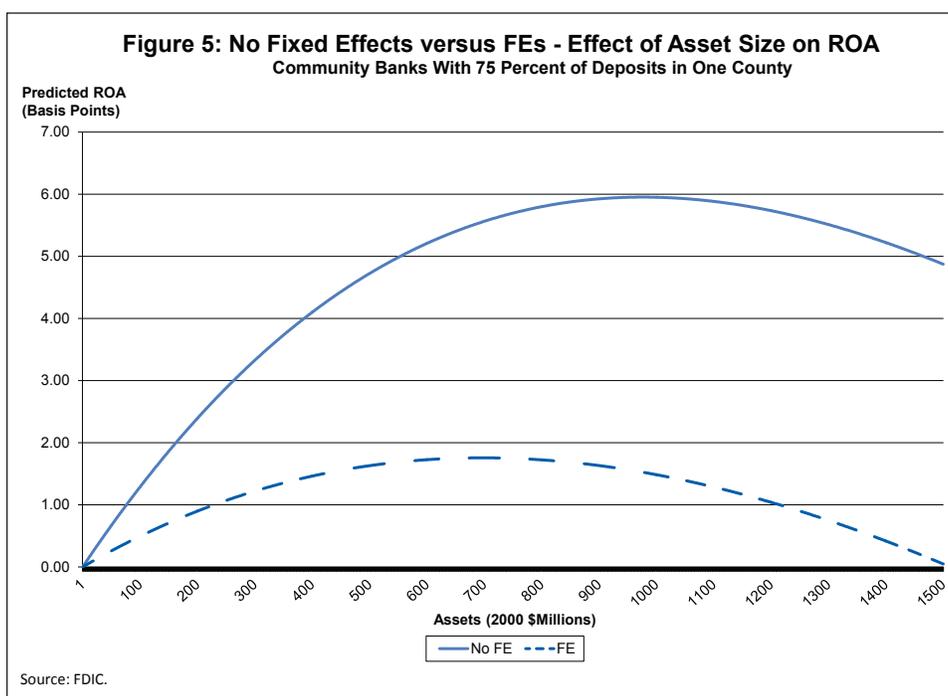
market is restricted to its headquarters county. Said differently, the negative effects of CRE and C&D lending on ROA are much more pronounced for the 50 percent sample, suggesting that banks with a more dispersed geographic market experienced poorer performance on their CRE and C&D lending activities, whereas this effect is not apparent for the other specialty lending categories. Among the loan specialization categories, estimates suggest that consumer loans offer the smallest ROAs. However, the bottom panel that presents F-statistics for tests of differences between coefficients shows that there does not appear to be statistically significant differences in the return offered by the different lending specialties.

Overall, the results in Table 2 suggest that higher bank ROAs are on average associated with traditional basic banking fundamentals: a business model based on lending (not security investments), with solid underwriting standards and loan administration practices that minimize nonperforming loans, and management attention focused on maximizing the use of core funding and minimizing overall funding costs. There appear to be some benefits from limited competition and economies of scale, and little evidence that specialization to any one particular type of lending increases bank ROA.

The ROA results regarding lending specialization may be unexpected since some of the specialization categories are often thought of as core CB businesses. For example, local C&D and CRE often are thought of as core business lines

for community banks and it may be surprising that both of these categories yield ROAs that are less than generic (meaning no specialty designation) CB lending. We undertake additional analysis of the loan specialization ROAs by decomposing asset lending returns into a pre-crisis period (1994-2007) and a crisis period (2008-2011). The entire regression specification in Table 2 is repeated, with the addition of new variables that measure each lending specialization share interacted with a crisis period dummy variable. In Table 3 we report only the coefficient estimates associated with the lending specialty categories and suppress the coefficient estimates on the other control variables.

Table 3 reports the coefficient estimates for the lending specialization shares and the lending specialization shares interacted with the crisis period dummy variable. When the data are analyzed accounting for the crisis period, it is clear that C&D had larger expected ROAs than the other lending specializations in the period before the crisis. When the crisis hit, however, consumer and residential real estate lending at CBs performed better and produced higher ROAs compared with their pre-crisis averages, while CRE, C&I, and especially C&D loans performed much worse than their pre-crisis averages would have suggested. Among these specialization categories, C&D lending generates the greatest ROA variability between the pre-crisis and crisis periods. The characteristics of C&D lending suggest that it has been a high-risk, high-expected return lending specialty for CBs.



A Closer Look at CB Economies of Scale

The issue of economies of scale in community banking is important. If scale economies are only attained at substantial size, strong economic forces will encourage growth or continued consolidation among existing CBs. It is difficult to control for differences in CB market conditions, location, business model and operating characteristics and also accurately estimate the ROA effects associated with bank size alone. While the regression in Table 2 controls for many features that affect bank ROA, the equation also includes bank fixed effects to account for important time-invariant bank-specific factors that may affect bank ROA but are not measured or included in the regression. A fixed effect estimator removes the effect of omitted variables by removing the time series averages of each bank's ROA, and the averages of the CB's associated explanatory variables, before estimating the regression coefficients in Table 2. This procedure changes the interpretation of the size-related coefficient estimates in the regression. Using the fixed effects estimator, the coefficients on individual bank size indicate how much a CB's ROA changes as each bank's size is altered from its sample average size.

If the economies of scale potential for increasing asset size are very large when banks are very small and diminish as banks grow large, the fixed effects estimator cannot measure this phenomenon. Instead, the fixed effect estimator will measure the sample average effect of an increase in size relative to each bank's sample average size. If there are many very small banks in the sample and scale economies are important for very small banks, the fixed effect estimator is likely to show a large potential for ROA increase from an increase in bank size even if larger banks cannot accrue these benefits. The fixed effect estimator does not identify an overall average optimal bank size, but instead indicates a range over which each bank might increase (or decrease) its size (measured relative to its own sample average size) and experience positive (or negative) ROA effects.

An alternative method that can be used to estimate economies of scale is to run ordinary least squares (OLS) estimates without bank fixed effects while controlling for other important observable factors that affect bank ROA. This approach produces an estimate of the optimal size of the bank, but the estimate may be biased by omitting bank fixed effects. An underlying assumption is that the technology that generates ROA is fixed over the sample period. The resulting bank size-related coefficient estimates relate bank ROA to the actual asset size of a bank (and not to bank size measured as deviation from each bank's sample

average size). If there are important bank-specific factors that are omitted from the regression but which are correlated with bank size and ROA, then the OLS estimator will give a biased estimate of the true size effect and attribute the combined effects of size and the omitted factors to size alone. As a consequence, omitted factors could impart a positive or negative bias to the size coefficient estimates. Still, given these caveats, the OLS estimator can provide a useful estimate of the economies of scale in CB ROA data.

Figure 5 plots the ROA-size relationship implied by the fixed effect and OLS estimator for the regression model specified in Table 2, for the 75 percent sample. The fixed effect, or "within" estimator, suggests that, on average, community banks in our sample could maximize their ROA by increasing their asset size above their sample average size by about \$700 million; the mean size for this sample is \$154 million. While the scale increase for achieving maximum ROA is large, the ROA effect—even at the optimum implied size—is less than 2 additional basis points (bps) over the bank's sample average ROA (about 30 bps per quarter over the sample period). In contrast, the OLS estimator suggests that the optimal size of a CB for maximizing ROA is roughly \$1 billion, and the scale economies associated from going from a very small bank to a billion-dollar bank improve ROA by about 6 basis points. While 6 bps is large relative to the sample quarterly ROA average, our estimates suggest that 3bps of these efficiencies are achieved by about \$300 million in assets, and about 5 bps are realized on average for CBs that reach \$600 million. Overall, our results suggest that scale economies can improve CBs' ROAs up to about \$1 billion in asset size, but a significant share of these benefits can be achieved at relatively modest scale.

Conclusion

Community banks exhibit substantial cross-sectional and time series variation in ROA. Much of the observed variation in CB ROA can be attributed to differences in the economic conditions CBs face in their local markets. We assume that economic conditions in a local banking market are exogenous, and use panel regression methods on a carefully selected sample of CBs to control for both variation in underlying economic conditions and in observable bank-specific characteristics. After controlling for economic conditions in CB local markets over time, we find that high ROAs are associated with above-average performance on operations and decisions that are basic to the banking intermediation process. Above-average ROAs are associated with higher loans-to-assets ratios, solid

underwriting and loan administration practices that minimize delinquent and nonperforming loans, limited use of noncore deposit funding and lower overall funding costs. CB lending specializations do not generally improve ROAs over generalized lending. ROAs increase as bank size increases, but benefits likely diminish beyond about \$1 billion in CB asset size, and CBs as small as \$300 million appear able to secure half of the total available scale benefit. Above-average loan investment concentrations outside of a bank's primary market in commercial and industrial, construction and development, and commercial real estate loans are associated with lower ROAs during our sample period.

References

Berger, Allen N. 1995. The Profit-Structure Relationship in Banking—Tests of Market-Power and Efficient Structure Hypotheses. *Journal of Money, Credit, and Banking* 27, no. 2: 404-431.

Berger, Allen N., Asli Demirguc-Kunt, Ross Levine, and Joseph G. Haubrich. 2004. Bank Concentration and Competition: An Evolution in the Making. *Journal of Money, Credit, and Banking* 36, no. 3: 433-451.

Berger, Allen N., Astrid A. Dick, Lawrence G. Goldberg, and Lawrence J. White. 2007. Competition from Large, Multi-market Firms and the Performance of Small, Single-Market Firms: Evidence from the Banking Industry. *Journal of Money, Credit, and Banking* 39, no. 2-3: 331-368.

Demirguc-Kunt, Asli, and Harry Huizinga. 1999. Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence. *The World Bank Economic Review* 13, no. 2: 379-408.

Hannan, Timothy H. and Robin A. Prager. 2009. The Profitability of Small Single-market Banks in an Era of Multi-market Banking. *Journal of Banking & Finance* 33, no. 2: 263-271.

Modigliani, Franco, and Merton Miller. 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review* 48, no. 3: 261-297.

Smirlock, Michael. 1985. Evidence of the (Non)Relationship between Concentration and Profitability in Banking. *Journal of Money, Credit, and Banking* 17, no. 1: 69-83.

Whalen, Gary. 2001. The Impact of the Growth of Large, Multistate Banking Organizations on Community Bank Profitability. Economic and Policy Analysis Working Paper 2001-5, Office of the Comptroller of the Currency.