The Performance Effects of Large Bank Presence in Rural Markets

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Abstract

We study the effects of the presence of large banks on market performance in rural markets. We find large banks, defined as those that are among the largest twenty-five banks nationally by total deposits and that hold at least ten percent of deposits in a state, are present in markets that have higher ROA and lower profit efficiency. Our findings suggest that big banks choose to operate in rural markets because they can earn available, high returns without having to compete on efficiency. These results are reduced, however, when more than one big bank is present in the local market. This study suggests that regulators use caution when allowing big banks to enter small, rural markets.

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I. Introduction

The presence of large banks in small markets may be a concern for a variety of reasons including how big banks might effect competition, profitability, and lending behavior within a small market. The question of how large banks might influence competition in turn raises concerns about anti-trust policies, at least on a local level, and whether increased government scrutiny is warranted when large banking organizations enter small, rural markets. Prior research has concluded that big-bank presence in rural markets lowers competition within the market since banking operations in those markets enjoy higher returns on assets. We revisit this question and also investigate whether or not higher returns in small markets are due to market power or if big bank presence helps improve efficiency. Big banks could enter small markets because they may be able to compete more efficiently due to economies of scale and improved product delivery systems. Or, big banks may have a presence in these small markets where there is plenty of profit to be made because of less competition creating higher loan prices and lower deposit prices in this local area. In other words, do big banks maintain a presence in markets where it is easier to extract rents, and/or do they compete in markets where they have a competitive advantage due to improved operating efficiencies?

Pilloff (1999) finds a significant relationship between the presence of a big bank in a local market and increased profitability for banks operating in that market. He suggests that big banks operating in a small market reduce the competition level in the market allowing the small banks operating in the same market to earn higher return on assets. Pilloff concludes that one reason big banks lower competition in these markets is there may be weak incentives for big banks to act aggressively in the local market.

We extend Pilloff's previous work in three main ways. First, we control for sample selection bias by using a two-stage Heckman correction model since big banks may choose to only be present in those markets that are or have the propensity to be highly profitable. Next, we increase the sample period to more than one year to test the generality of the results. Finally, we use both return on assets and profit efficiency in our tests to affirm the previous results and to offer insight as to whether big banks may be competing on efficiency within the rural market or whether they are not. If the profit efficiency of banks within the sample markets is lower when a big bank is present than in markets where a large bank is not, then big banks choosing to operate in the sample markets can generate sufficient returns without having to be more efficient than their competitors. Intuitively, markets where banks enjoy market power and rent extraction without highly efficient competitors are where you would expect big banks to maintain a presence.

We find, after controlling for selection bias through a Heckman correction, that the presence of big banks in a local rural market is associated with higher return on assets but lower profit efficiency for sample banks in that market. It appears big banks may be choosing to operate in markets that are highly profitable without having to be efficient to produce these profits indicating some measure of market power. Our findings suggest that regulators and other stakeholders should view big bank entry into rural markets carefully as banks attempt to extract rents in these small markets.

II. Literature Review

We closely follow the work of Pilloff (1999) who finds increased profitability as measured by ROA in markets where a big bank is present. He asserts that big banks could

increase competition within a rural market if they wanted, but they may choose not to act aggressively and let smaller banks exercise their relative market power within the rural market. The choice of big banks to avoid aggressive action may reduce competition thereby allowing increased profitability for small banks within the rural market.

Given our hypotheses about potential market power and competition, a review of the market power, small business lending, and market entry literature in banking is warranted.

A. Market Power

Market power studies have conflicting findings about the relation between prices and market concentration. Berger and Hannan (1998) find increased market power where banks in more concentrated markets charge higher loan rates and pay lower deposit rates. Conversely, Simons and Stavins (1998) find some deposit rates rose and some fell depending on the level of concentration when comparing market prices before and after merger activity. Hannan (1991) finds evidence that market power is very low in a 1984 sample. Akhavein, Berger, and Humphrey (1997) find little market price changes after a merger, but do find increased efficiency.

Market power may have declined over time as shown by Santomero (1999). The decline in market power is likely true because of technological advancements. Empirical findings on market power through deposit and loan prices are mixed with some finding support, such as Cyrnak and Hannan (1998), and others finding no support such as Radecki (1998). Other research in support of market power includes Jackson (1997), and Berger and Hannan (1998). Neumark and Sharpe (1992) find market power for deposits where banks in concentrated markets are slower to raise deposit rates and quicker to lower them with changes in market

interest rates. In contrast, Sapienza (2002) finds in-market mergers result in a substantial decline in loan rates for business borrowers

In summary, the results for market power are mixed with some finding market power, and others not. The results depend on sample period, whether or not mergers and acquisitions were involved, and other measurement issues. In the case of large bank presence in rural markets, these prior results indicate that market power is perhaps equally likely to exist, and that big banks may desire to maintain a presence in those markets with the highest likelihood of market power.

B. Small Business Lending

Large banks may also maintain a presence in small rural markets due to a lack of competition for business lending. Many studies find evidence that smaller banks tend to make more relationship oriented small-business loans. If there are few relationship-oriented lenders in a rural market, this lack of competitors could increase the likelihood that big banks will desire a presence in these markets to lend to these customers.

Studies of relationship lending typically investigate small bank loan quantities and prices to small businesses as compared to large-institution lending to small businesses. Petersen and Rajan (1994) use survey data from the SBA and find multiple bank relationships reduce quantities and increase loan prices for borrowers. Berlin and Mester (1998) hypothesize that customers with bank relationships will have loan rates smoothed in response to credit and interest rate shocks, but find evidence that banks smooth only in response to interest rate shocks. Detragiache, Garella, and Guiso (2000) provide theory that multiple banks can reduce adverse selection and early project liquidation, and find empirical evidence that better economic

conditions increase the likelihood of a single bank. Together, these empirical findings indicate that big banks are more likely to maintain a presence in a rural market where there are fewer relationship lenders and multiple big banks.

C. Bank Efficiency as Motivation for Big Bank Presence

An additional reason for big bank presence in a rural market is to compete with less efficient banks in the market. It follows that big banks are more likely to enter and stay in that market if the competitors in that market are inefficient. Put another way, big banks are likely to find it desirable to operate in a less efficient market because they can still make attractive returns with average intra-bank levels of efficiency.

We turn to studies of changes in efficiency after takeover activity since these studies are the most likely to reveal motivations for big bank presence in rural markets. Most of these studies show little cost-efficiency differences after M&A activity. For example, Berger and Humphrey (1992) find in over half of large mergers in the 1980s, the acquirer was more efficient than the target; however, efficiency improvements were not very successful, on average. Peristiani (1997) finds acquirers did not improve efficiency after a merger for a sample of takeovers from 1980 to 1990, but had small gains in scale efficiency. Rhoades (1998) investigates nine case studies and finds that only four out of nine mergers were successful in improving efficiency.

More recently, researchers have focused on profit efficiency since this specification allows for inefficiency in both inputs and outputs. Akhavein et al. (1997) find a 16 percentage point increase in relative profit efficiency after a merger, largely due to increasing revenues by

banks shifting output towards loans. Berger (1998) finds higher profit efficiency after the takeover and that the improvement was in part due to better risk diversification.

In total, efficiency studies suggest that substantial improvements in efficiency are possible, but not likely as banks get larger and expand products into new markets. While results are mixed, they tend to indicate no significant difference in efficiency with increases in size and scope regardless of merger activity in the market. As an application to big bank presence, it is unclear that inefficiency would be a main reason for entry and market presence, but conventional wisdom suggests that banks would wish to compete in markets that are less efficient.

II. Data and Methods

The sample is constructed over the period of 1996 through 2002, using data from several sources. First, data for individual banks were taken from the Summary of Deposits (SOD) provided by the FDIC as of June 30 of each year, and from the Call Reports provided quarterly each year by the Chicago Federal Reserve. Next, market population estimates for each year based on census data from the census bureau were taken from a database provided by the Centers for Disease Control (CDC). Finally, yearly profit efficiency for each sample bank and the yearly Hirfindahl-Hirschman Index (HHI) values for each sample market (county) were calculated from Call Report data. The profit efficiency measure is used because it accounts for errors on the output side as well as those on the input side.

We estimate the efficient profit frontier using all banks for every year, not just rural banks, so that each estimate is a proportion of the frontier using all banks and not just those in our sample. We use profit efficiency as in Cyree and Wansley (2005), which is a combination of the model of DeYoung and Hasan (1998) and Berger and Mester (1997). This model is chosen

since it allows banks to have negative profits and still remain in the sample, which is particularly important in small rural markets where the numbers of competitors are usually low. The outputs chosen for this method allow some power over output quantities rather than the standard output prices. Profit efficiency also allows for inefficiency in outputs and inputs (see Berger, Hancock, and Humphrey (1993)).

Our model uses a Fourier-flexible form similar to DeYoung and Hasan (1998) and Berger and Mester (1997) and includes trigonometric terms to account for banks that are far from the sample means for dependent variables. This ability is especially important for small banks, most of which are the competitors to big banks in the rural areas contained in our sample

For input prices, we estimate averages across geographic areas in MSAs or rural counties as in DeYoung and Hasan (1998). The outputs for each year vary at the bank-specific level and our estimation for only one year avoids the problem of technological change and inter-temporal differences. The dependent variable is operating profit less loan-loss reserves, and we add a constant that varies for each year and equals the absolute value of the minimum profit plus one added to each firm so that profit is positive.[1] There are three outputs at the bank-level: total loans, securities, and fee-based financial services measured as non-interest income less service charges on deposit accounts.[2] The input price vector is measured at the MSA level for the cost of borrowed funds, the price of physical capital, and the wage rate of labor. Z is a conditioning vector that includes a Herfindahl index for each geographic area, the average non-performing loan ratio in the geographic area, and bank-specific equity capital. The Fourier terms are the trigonometric terms that provide a global approximation of the profit function when values of Y

[1] See Berger and Mester (1997) page 917 for details.
[2] Note that we use securities as an output as in Berger and Mester (1997) rather than transactions deposits as in DeYoung and Hasan (1998).

are far from the sample mean. The nine X variables are Y, Z, and W variables transformed so they fall on the interval of the domain of trigonometric functions.[3]

The error terms are separated into two parts as in Jondrow, et al. (1982), DeYoung and Hasan (1998), and Berger and DeYoung (1997) with *u* representing profit inefficiency and *v* representing a normal random error. We transform the errors such that the inefficiency is stated as a proportion of actual profits as compared to the predicted profits if the bank were on the stochastic frontier for a particular year, net of random error, while subtracting out the constant in each year as in Berger and Mester (1997):

$$Alt\ \pi\ EFF^{b} = \frac{\hat{\pi}_{b}}{\hat{\pi}_{\max}} = \frac{\exp[\, f(Y^{b}, W^{b}, Z^{b}, v^{b}) \times \exp(\ln \hat{u}_{\pi}^{b}) - \theta}{\exp[\, f(Y^{b}, W^{b}, Z^{b}, v^{b}) \times \exp(\ln \hat{u}_{\pi}^{\max}) - \theta} \qquad (1)$$

For example, a bank that has profit efficiency of 0.80 is operating at 80 percent efficiency, or 20 percent inefficiency, for a particular year as compared to the most efficient bank, regardless of location.

The final sample contains individual banks (savings and loan institutions are excluded from the sample) that operated in one rural county as of June 30 each year according to the SOD and contains information on the individual county in which the sample bank operated. The SOD contains information on roughly 89,000 FDIC-insured banks. For a bank to be included in the sample, all of the following three criteria must be met: 1) the bank's offices are located in one county, 2) the county has to be in a non metropolitan statistical area (non MSA), and 3) there must be at least two other banks operating in the same rural county. This sampling technique resulted in an unbalanced panel of data since banks do not necessarily appear in the sample from year to year although most appeared to be stable across time periods. Banks may leave the

[3] We use the transformation of the variables such that they lie in the interval from [0.1*2π, 0.9*2π] as in footnote 3 of Berger, Leusner, and Mingo (1997). Also, we use only the transformed variables for the outputs as discussed in DeYoung and Hasan (1998) footnote 15 as well as Berger and Mester (1997) footnote 29.

sample for any reason that violates any of the above-listed criteria including opening offices in another market. Also, a bank may leave the sample due to no action on its part if fewer than three banks operate in a market in a given year. Table 1 presents a breakdown of the number of sample banks by year; the unbalanced panel consists of 19,400 observations over seven years from 1996 through 2002. The sample contains a mean of 2,771 sample banks per year. Also included in our observations is an indicator for whether there is a big bank operating within the sample banks one-county market.

Following Pilloff (1999), a big bank is defined as a bank meeting the following two criteria: 1) the bank is one of the 25 largest banks or bank holding companies in the United States, not including savings and loan institutions, as determined by total deposits as of June 30 in each year, and 2) the bank holds at least 10% of total deposits in a state.[4] For example, if in a particular year a bank that is one of the 25 largest banks in the nation holds 12% of total state deposits in Florida but only 8% of total state deposits in Colorado, that bank would be considered a big bank in all counties within Florida but would not be considered a big bank in any of the counties in Colorado during the year. Referring again to Table 1, there was a total of 2,921 observations in which banks competed with at least one big bank in their markets and a total of 651 observations in which banks had multiple big banks operating in their markets during the sample period. The yearly mean is 417 and 93 sample banks that competed with at least one big bank and with more than one big bank respectively during each year of the sample. Note that observations of sample banks competing with at least one big bank in their markets and sample banks competing against more than one big bank in their markets are not mutually exclusive as observations of banks competing with multiple big banks are also included in observations of banks with at least one big bank in their markets.

[4] For ease of exposition, we term bank holding companies as banks unless otherwise noted.

We use a two-step Heckman correction procedure to control for the fact that big banks may choose to operate in more profitable markets. The models are constructed to test the effect of a big bank's market presence on the profitability of sample banks. In the first step, we use a Probit model to estimate the probability that a big bank is present in a sample market. In the second step, the inverse Mills ratio from the first-step Probit is used to control for the probability that a big bank chooses to operate in the sample bank's market.

The following model is used in the first-step Probit analysis to estimate the probability that a big bank is present in the local market (county) of a sample bank:

$$BIG = f(LNPOP, POPGROWTH, HHIADJ, MBB, MKTAVGROA, NUMBER_BANKS) \quad (2)$$

where BIG is a binary dependent variable taking the value of one if a big bank is present in the sample bank's local market and zero otherwise; LNPOP in the natural log of the estimated population for the county; POPGROWTH is the calculated growth rate for county population from one sample year to the next; HHIADJ is the HHI for the local market divided by 1000; MBB is a dummy variable equal to one if there is more than one big bank present in the local market and zero otherwise; MKTAVGROA is the mean value of mean quarterly ROA of banks operating in the sample market; and NUMBER_BANKS is the total number of banks operating in the market. These variables are included in the model because big banks may only choose to operate in markets that are larger, are experiencing growth, are competitive, are free from other large banks, are more profitable than other markets, or have fewer numbers of banks with which to compete.

The regression model used in the second-step uses one of two dependent variables: average return on assets (AVGROA) or yearly profit efficiency (PROFEFF) as discussed in the

prior section. To estimate the effect a big bank's presence has on the profitability of sample banks, we used the following model:

$$PERF = \alpha + \beta_1 BIG + \beta_2 LNPOP + \beta_3 POPGROWTH + \beta_4 HHIADJ + \beta_5 LNAVGASSETS \quad (3)$$
$$+ \beta_6 AVGLOANAST + \beta_7 MBB + \beta_8 NUMBER_BANKS + \beta_9 LAMBDA + \gamma W + \varepsilon$$

where PERF is one of two measures of profitability. AVGROA is the first performance measure used and is defined as the mean of the sample bank's reported quarterly ROA for the year. PEFF is the second measure and is defined as the sample bank's ratio of profit as compared to the best practice bank located on the efficient frontier for the year given the bank's inputs and outputs. LNAVGASSETS is the natural log of the mean quarterly assets of each sample bank reported for the year and controls for sample-bank size; used as a measure to control for risk-levels of sample banks, AVGLAONAST is the mean quarterly ratio for each year of total loans to assets, LAMBDA is the inverse Mills ratio from the first-step Probit used to control for the probability that a big bank chooses to operate in a sample market, and epsilon is the error term assumed to be normally distributed. All other variables are as defined earlier. The second-stage regression model is estimated using ordinary least squares, and we include a matrix, W, of yearly dummy variables to control for time effects for dummy variables Y96 through Y01 which are used to control for yearly fixed effects.

The model was tested for collinearity of explanatory variables using variance inflation factors because of the possibility that HHIADJ and NUMBER_BANKS were highly correlated. The variance inflation factors are not reported, but we find that collinearity of explanatory variables is not a problem.

III. Empirical Results

Summary statistics comparing the means of sample variables for rural banks competing with big bank(s) versus those not competing with any big banks are presented in Table 2. AVGROA between the groups is virtually identical and therefore the difference is not significant for big-bank markets compared to non-big-bank markets. PROFEFF, however, reveals that sample banks located in big-bank markets have a mean profit efficiency that is significantly lower than those sample banks in non-big-bank markets. Previous research has shown that it is difficult to draw conclusions about differences in ROA between these groups using simple mean analysis, and our results are just as problematic. In contrast, our results for profit efficiency support the idea that banks operating in rural markets where big banks choose to operate are not as profit efficient, so the big banks operating in those markets may be able to earn higher profits without competing on efficiency. Another interesting finding from difference in means analysis for the HHI variable indicates that big banks operate in sample-bank markets that are significantly less competitive. This result confirms Pilloff's findings, but the question remains: does big-bank presence in these markets cause the less competitive environment or are large banks attracted to these markets because they offer the opportunity to extract rents?

The differences in means for the other sample variables are largely as expected. First, sample banks in big-bank markets are significantly larger than those in non-big-bank markets as measured by total assets. Second, big banks operate in markets that are significantly larger in population and have a significantly faster population growth than markets without a big bank. Next, the total number of banks located in rural markets where a big bank operates is significantly higher than in non-big-bank markets. The average market ROA for all banks in big-bank sample markets is not significantly different from the average market ROA of banks in

non-big-bank markets. Lastly, sample banks competing with a big bank lend at a significantly higher ratio of total loans-to-assets than do sample banks not competing against a big bank. Since these are univariate results, they should be interpreted with care. Regression analysis in the next section offers further insight into the univariate findings.

A. First-Stage Probit Regression Results for Big Bank Presence

The sample contains a total of 2,921 observations for banks that competed with at least one big bank over the sample period and 16,479 observations for banks operating in markets without a big bank. Results from first-step Probit analysis shown in Panel A of both Table 3 and Table 4 indicate factors that affect the probability that a big bank is located in a sample-bank market. As market population increases and as market population grows at a higher rate, there is a significant increase in probability that a big bank will be located in the sample market. Big banks appear to operate in markets that have more individual banks since the estimate for the NUMBER_BANKS variable is positive and significant; however, if one of those individual banks located in a market is another big bank it does not affect the probability that a big bank will be present in the market as the estimate for multiple big banks in the market is insignificant.

Importantly, estimates for average market ROA and the market Hirfindahl index indicate that big banks are significantly more likely to be located in those markets that are more profitable and those markets that are less competitive, respectively. The results for these two variables support our contention that big banks choose to operate in markets where profitability is high but that are less competitive so that they may enjoy market power. In all years 1996 through 2001, excluding 2000, a big bank is significantly is significantly less likely to be present in the local markets. No marginal effects were calculated for the explanatory variables in the Probit model

since they are not germane to our analysis; however, the inverse Mills ratio from the first-step regression is included as the independent variable LAMBDA in the second-step OLS regressions for the dependent variables of average ROA and profit efficiency.

B. Cross-Sectional Regression Results for Market Performance

In this section, we report the results of the performance regressions to investigate the hypothesis that big bank presence is related to differential market performance. Panel B of Table 3 contains the results for the regression using average ROA as the dependent variable. Several important results stand out. First, the variable of most importance to this analysis is the BIG indicator for large-bank presence in local markets. After controlling for the probability that a big bank will be present in given market, we find that the average ROA for sample banks is significantly increased when a big bank is present. Interestingly, the effect of multiple big bank presence is significant and negative. These estimates imply that a single big bank operating within the rural market is associated with increased profitability as measured by ROA, but as more big banks operate in local markets return on assets is lower. Multiple bank markets having lower ROA implies that when a big bank is faced with a competing big bank in a local rural market, big banks choose to act aggressively thereby increasing competition in order to compete with other big banks. So, the big-bank behavior of extracting rents in local rural markets seems to be tempered by the presence of other competing big banks. Next, the estimate for HHIADJ is negative and statistically significant. Finally, LAMBDA included from the first-step regression is significant implying that the control for big bank presence in particular types of markets is necessary.

Larger markets have a significantly negative effect on ROA while those markets that are growing faster have significantly higher ROA, ceteris paribus. The result that larger sample banks as measured by total assets earn significantly higher returns on their assets agrees with conventional banking wisdom that larger banks make more profit, but when a sample bank lends proportionally more, returns are significantly lower as shown by the loans-to-assets coefficient. The small magnitude of the estimate for loans-to-assets raises the question of whether there is economic significance associated with this measure regardless of statistical significance. The number of banks within a local rural market does not significantly affect return on assets. The estimates for yearly dummy variables included in the model show that the year from which observations were taken significantly affects the return on assets measure.

The results for the variables BIG, MBB, HHIADJ, and LAMBDA in Table 4, Panel B, allow insight into how big banks affect market profit efficiency. When a big bank is present in a sample market, profit efficiency is significantly lower. This result also appears to be tempered as more big banks enter the sample market since the estimate for the multiple-big-bank variable is significantly positive. Therefore, big banks may be able to extract rents in profitable, rural markets while operating relatively inefficiently when there is not a competing big bank present, but if more than one big bank is present, it appears that all banks must compete on efficiency. Again, as in the results for the regression using average ROA as the dependent variable, LAMBDA from the first-step Probit significantly affects profit efficiency indicating the control for big bank presence in particular types of markets is necessary in this analysis.

Control variables also provide evidence for the effects of big bank presence on market performance. When profit efficiency is used as the dependent variable in the second-step OLS model, there are some contrasting results when compared to results for average ROA. In Table

4, Panel B, larger markets have significantly higher profit efficiency while a faster growing population decreases profit efficiency. Larger sample banks as well as those banks lending at a higher loan-to-asset ratios are associated with significantly higher levels of profit efficiency. Again, as in the previous results, the number of individual banks in the market has no significant effect on profit efficiency, and yearly fixed effects are significant, with the exception of 2000.

V. Conclusions

In this paper, we improve the analysis of the effects that big-bank presence has on profitability of banks that operate exclusively in a rural market. Specifically, we extended the research on this topic in two important ways. First, we control for selection bias because big banks choose to operate in some markets and choose not to operate in others. We use a two-step Heckman correction procedure with a Probit model in the first-step to control for possible selection bias. The inverse Mills ratio included from the first-step was significant for both dependent variables in the second step OLS performance regressions. This significance indicates that the control for big banks choosing to operate in particular markets is necessary in this analysis. Second, we added a second performance measure to test the effects of big banks in sample markets on both return on assets and profit efficiency.

There are three important results from our work: 1) big-bank presence in a local rural market increases return on assets, 2) big-bank presence in these markets decreases profit efficiency, and 3) whatever effect big-bank presence has on return on assets and profit efficiency is reduced by the presence of more than one competing big bank operating in the sample market. Our conclusion from these results is that big banks choose to operate in highly-profitable markets where they do not have to compete on efficiency to earn high returns, which suggests some

degree of exercisable market power. However, this market power is reduced or eliminated if there is more that one big bank operating in the market, and the big banks must operate efficiently to earn profits. Implications of this study include that regulators and other stakeholders must use caution when deciding to allow big banks to enter these markets as big banks attempt to extract rents from these small markets when no other large competitor is present.

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Table 1
Number of Banks in the Sample by Year

Sample Year	Number of Banks in Sample	Number of Sample Banks with a Big Bank in Their Market	Number of Sample Banks with Multiple Big Banks in Their Market
1996	3,536	345	70
1997	3,304	395	82
1998	3,057	401	79
1999	2,826	378	69
2000	2,669	549	82
2001	2,498	497	146
2002	1,510	356	123
Total	19,400	2921	651

Table 1 presents the number of banks in the sample for each year of the sample period 1996 – 2003. To be included as a sample bank, all of the following criteria must be met: 1) the bank must operate exclusively in one county, 2) the county in which the bank operates must be a non metropolitan statistical area (non MSA), and 3) there must be at least two other banks (whether they are considered big or not) operating in the same county. A big bank is one that meets both of the following criteria: 1) one of the 25 largest banking institutions in the United States as measured by total deposits in a year and 2) hold at least 10% of the deposits within an individual state. A market is defined as the county in which a sample bank operates. Markets with multiple big banks are those markets that have at least two big banks operating in the market.

Table 2
Means and t-tests for differences in means between market types from 1996 to 2002

Variable	Big-BankMarkets (N=2,973 Banks)	Non-Big-Bank Markets (N=16,324 Banks)	Difference in means	t-statistic for differences in means
AVGROA (%)	0.7400	0.7500	-0.0100	-0.76
PROFEFF	0.5621	0.5753	-0.0132***	-5.20
AVGASSETS (1,000)	76,988	56,179	20,809***	13.31
AVGLOANAST	0.5980	0.5691	0.0289***	10.18
POP	41,357	24,139	17,218***	41.15
POPGROWTH	0.0055	0.0025	0.0030***	12.62
HHI	4,800.50	4,195.40	605.10***	12.26
NUMBER_BANKS	8.9086	7.3420	1.5666***	22.26
MKTAVGROA (%)	0.7300	0.7400	-0.0100	-1.11

Table 2 contains means and t-tests between rural markets with a big bank present and rural markets without a big bank present. Variables describing sample banks in the market include the following: AVGROA is the yearly mean percentage of quarterly return on assets; PROFEFF is yearly profit efficiency; AVGASSETS is the yearly mean of quarterly-reported assets measured in 1,000's; and AVGLOANAST is the yearly mean of quarterly ratios of total loans to assets. Market-description variables include the following: POP is the estimated county population; POPGROWTH is the calculated yearly population growth rate; HHI is the Hirfindahl-Hirschman Index; MBB in an indicator equal to one if there is more than one big bank in the rural market; NUMBER_BANKS is the number of banks (not offices, but separate FDIC certificate numbers) that operate in the local market; and MKTAVGROA is the mean AVGROA for all banks in the local market.

*** indicates significant difference in means at the 1% level for big-bank markets vs. non-big-bank markets.

Table 3
Two-stage regression model for average return on assets (AVGROA)

Panel A: Heckman Correction Probit Results		
Variable	Estimate	p-value
Intercept	-8.1290***	<.0001
LNPOP	0.6642***	<.0001
POPGROWTH	2.3583**	0.0299
HHIADJ	0.0833***	<.0001
MBB	7.5518	0.9967
NUMBER_BANKS	0.0090*	0.0624
MKTAVGROA	9.8915**	0.0108
Y96	-0.5396***	<.0001
Y97	-0.4138***	<.0001
Y98	-0.3460***	<.0001
Y99	-0.3211***	<.0001
Y00	0.0053	0.9191
Y01	-0.1102**	0.0398
Panel B: Second Stage OLS for Dependent Variable AVGROA		
Variable	Estimate	p-value
Intercept	0.0059***	<.0001
BIG	0.0041***	<.0001
LNPOP	-0.0010***	<.0001
POPGROWTH	0.0068***	0.0047
HHIADJ	-0.0001***	<.0001
LNAVGASSETS	0.0010***	<.0001
AVGLOANAST	-0.0005***	0.0078
MBB	-0.0032***	<.0001
NUMBER_BANKS	3.08×10^{-6}	0.7983
Y96	0.0010***	<.0001
Y97	0.0012***	<.0001
Y98	0.0007***	<.0001
Y99	0.0003**	0.0112
Y00	0.0004***	0.0015
Y01	-0.0003**	0.0324
LAMDA	-0.0022***	<.0001

Table 3 presents the two-stage regression model where the first-stage Probit model estimates the probability a big bank operates in the local market, and the second-stage is an OLS model for AVGROA. BIG is an indicator variable for the presence of a big bank in the sample market; LNPOP is the natural log of market population; POPGROWTH is the calculated yearly population growth rate; HHIADJ is the Hirfindahl-Hirschman Index for the market divided by 1000; LNAVGASSETS is the natural log of a sample bank's mean quarterly assets measured in 1,000's; AVGLOANAST is a sample bank's mean quarterly ratio of total loans to assets; MBB is an indicator equal to one if there is more than one big bank in the market and zero otherwise; NUMBER_BANKS is the number of banks operating in the market; Y96 – Y01 are dummies to control for yearly fixed effects with 2002 the omitted year; and LAMDA is the inverse Mills ratio from the first-stage Probit model. N = 2,921 observations for sample banks in markets with at least one big bank, and N = 16,479 observations for sample banks in markets without a big bank present. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.

Table 4
Two-stage regression model for profit efficiency (PROFEFF)

Panel A: Heckman Correction Probit Results

Variable	Estimate	p-value
Intercept	-8.1290***	<.0001
LNPOP	0.6642***	<.0001
POPGROWTH	2.3583**	0.0299
HHIADJ	0.0833***	<.0001
MBB	7.5518	0.9967
NUMBER_BANKS	0.0090*	0.0624
MKTAVGROA	9.8915**	0.0108
Y96	-0.5396***	<.0001
Y97	-0.4138***	<.0001
Y98	-0.3460***	<.0001
Y99	-0.3211***	<.0001
Y00	0.0053	0.9191
Y01	-0.1102**	0.0398

Panel B: Second Stage OLS for Dependent Variable PROFEFF

Variable	Estimate	p-value
Intercept	0.1095***	<.0001
BIG	-0.0860***	<.0001
LNPOP	0.0182***	<.0001
POPGROWTH	-0.2088***	0.0011
HHIADJ	0.0028***	<.0001
LNAVGASSETS	0.0141***	<.0001
AVGLOANAST	0.1572***	<.0001
MBB	0.0395***	0.0016
NUMBER_BANKS	-2.27×10^{-4}	0.4797
Y96	0.1786***	<.0001
Y97	0.0306***	<.0001
Y98	-0.0188***	<.0001
Y99	0.0702***	<.0001
Y00	-0.0004	0.9104
Y01	-0.0069***	0.0428
LAMDA	0.0435***	<.0001

Table 4 presents two-stage regression model results where the first-stage Probit model estimates the probability a big bank operates in the local market, and the second-stage is a OLS model for Profit Efficiency (PROFEFF). BIG is an indicator variable for the presence of a big bank; LNPOP is the natural log of market population; POPGROWTH is the calculated yearly population growth rate; HHIADJ is the Hirfindahl-Hirschman Index for the market divided by 1000; LNAVGASSETS is the natural log of a sample bank's mean quarterly assets measured in 1,000's; AVGLOANAST is a sample bank's mean quarterly ratio of total loans to assets; MBB is an indicator equal to one if there is more than one big bank in the market and zero otherwise; NUMBER_BANKS is the number of banks operating in the market; Y96 – Y01 are dummies to control for yearly fixed effects with 2002 the omitted year; and LAMDA is the inverse Mills ratio from the first-stage Probit model. N = 2,921 observations for sample banks in markets with at least one big bank, and N = 16,479 observations for sample banks in markets without a big bank present. *, **, and *** indicate significance at the 10%, 5%, and 1% levels respectively.