COMPETITION, PERFORMANCE AND FINANCIAL STABILITY IN THE U.S. AGRICULTURAL BANKING

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Competition, Performance and Financial Stability in the U.S. Agricultural Banking

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Motivation

There is a decreasing trend in the number of U.S. commercial banks as the number of banks fell from 10,821 to 5,997 from 1994 to 2013 (see Figure 1) resulting in increased consolidation. A decrease in the number of banks may reduce bank competition. Does this potential increase in market power make the banking sector more vulnerable? Specifically, can small banks (less than 250 million dollars in total assets size) compete in this changing scenario? Many small banks lend to the agricultural sector. Almost 90 percent of agricultural banks (the share of agricultural loans to total loans greater than 25 percent) are small banks. The number of U.S. agricultural banks has declined from 2,927 in 1994 to 1,500 in 2013 (see Figure 1). The major focus of this study is to examine whether the risk of failure and the performance of agricultural banks has been affected by the consolidation.

Significance

There is a lack of literature on the impact of competition on stability and performance for U.S. agricultural banks. Agricultural banks hold more than forty percent of the U.S. farm debt, the share of non-real estate farm debt is almost fifty percent. The decrease in the number of banks or the level of competition in agricultural banking may cause an adverse effect on relationship lending. This may occur because more concentrated banking makes it more difficult to access the credit [1]. Further, loan contracts are likely to be more restrictive due to an increase in information asymmetry [2]. The decrease in bank competition may have an adverse effect on agricultural producers [3]. Thus, this study identifies the effect of bank competition on the financial health and performance of agricultural banks.

Data

This study uses Call Report data from 1993-2013 to estimate the impact of bank competition on performance and financial stability of agricultural banks.

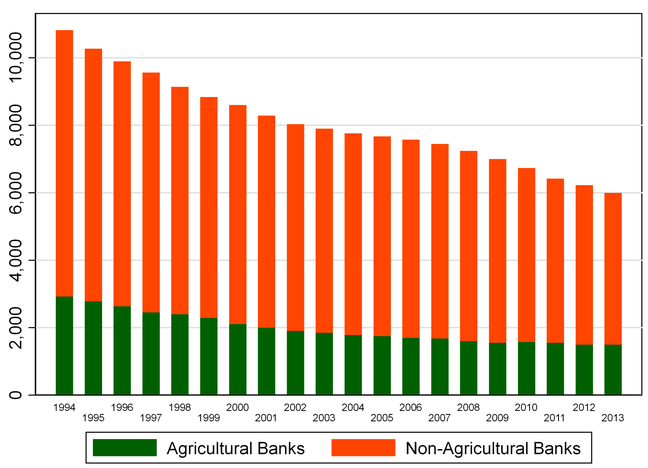

Figure 1. Number of Agricultural and Non-agricultural Banks in the U.S.
Note: Agricultural banks represent the banks with more than 25% of agricultural loans in their total loan portfolio.

Competition, Financial Stability, and Performance Measures

A Lerner index is constructed at the bank year level to measure competition. A Z-Score is constructed to measure bank stability. Similarly, the return on assets (net income to total assets ratio), return on equity (net income to the total equity ratio), agricultural loan ratio and agricultural loan volume are used as the performance measures for agricultural banks.

The Lerner index for a bank i at time t can be expressed as:

$$LernerIndex_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \tag{1}$$

where P_{it} is the price of total assets and MC_{it} is the marginal cost.

The Z-score (Z_{it}) for bank i at time t can be obtained as:

$$Z_{it} = \frac{ROA_{it} + EA_{it}}{\sigma(ROA)_{it}} \tag{2}$$

where ROA_{it} is the return of assets, EA_{it} is the ratio of total equity to total assets and $\sigma(ROA)_{it}$ is the standard deviation of the ROA.

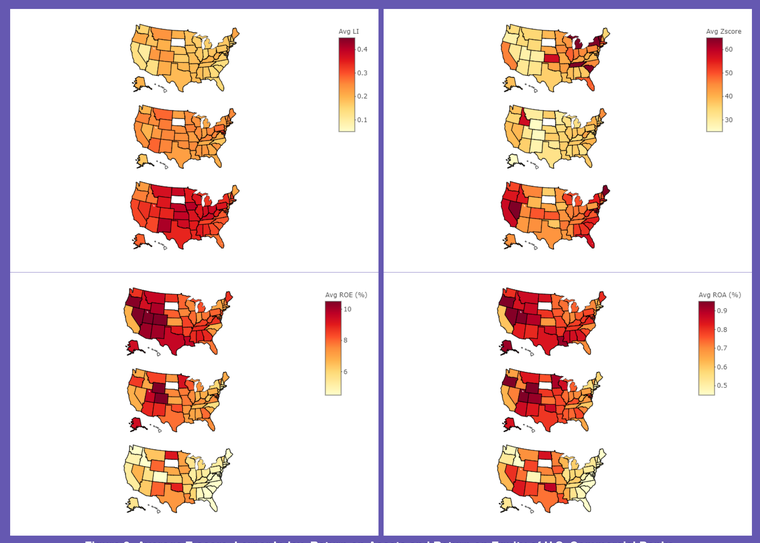

Figure 2. Average Z-score, Lerner Index, Return on Assets and Return on Equity of U.S. Commercial Banks.
Three maps in the top left, top right, bottom left and bottom right respectively plot the state level average of Lerner Index, Z-score return on assets and the return on equity of all commercial banks in 1994 (top), 2003 (middle) and 2013 (bottom).
Note that South Dakota is excluded from our estimation sample.

A normalized translog cost function is estimated at the bank quarter level to obtain the marginal cost MC_{it} in equation 1. Following [4], total operating cost (TC_{it}) is a function of three input prices (price of borrowed funds ($W_{j=1,it}$), price of capital ($W_{j=2,it}$) and price of labor ($W_{j=3,it}$)). There are two outputs: total loans ($Y_{p=1,it}$) and total securities ($Y_{p=2,it}$), and time trend (T). The normalized translog cost function is estimated after imposing symmetry and and linear homogeneity in input prices. The sum of derivatives of the cost function with respect to total loans ($Y_{p=1,it}$) and total securities ($Y_{p=2,it}$) yields the marginal cost (MC_{it}) for bank i at time t as :

$$MC_{it} = \frac{TC_{it}}{Y_{it}} \frac{\partial ln TC_{it}}{\partial Y_{it}} = \frac{TC_{it}}{Y_{it}} \left(\sum_{p=1}^{2} \gamma_{y,p} + \sum_{j=2}^{3} \sum_{p=1}^{2} \gamma_{jp,wy} ln(\widetilde{W_{j,it}}) + \sum_{p=1}^{2} \gamma_{pp,yy} ln(Y_{p,it}) + \left(\frac{1}{2}\right) \gamma_{12,yy} ln(Y_{1,it}) ln(Y_{2,it}) + \sum_{p=1}^{2} \gamma_{pT,y} T \right) \tag{3}$$

Empirical Estimations

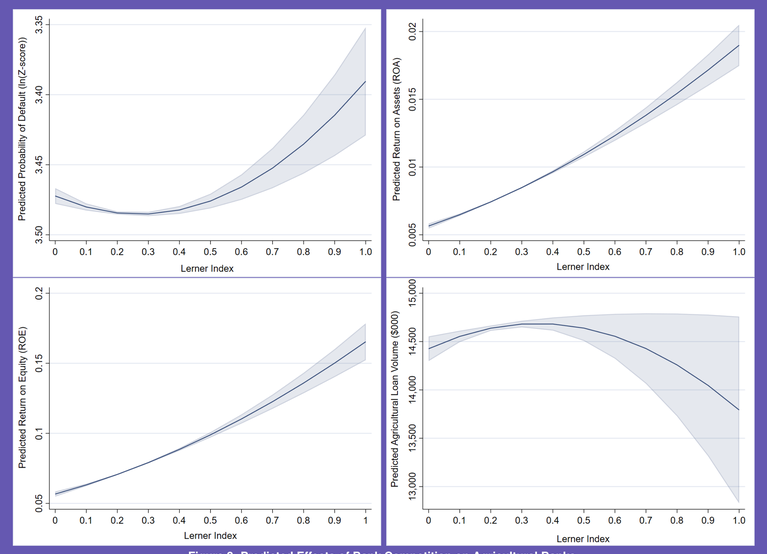

Figure 3. Predicted Effects of Bank Competition on Agricultural Banks.
Figures at the top left, top right, bottom left and bottom right respectively show the predicted effect of bank competition (Lerner Index) on probability of default (logarithm of Z-Score), return on assets (ROA), return on equity (ROE), ag loan volume and ag loan ratio of agricultural banks. Scale of y-axis is reversed in figure (a) because lower Z-score implies a higher probability of default. The shaded area shows the 95% confidence bands.

To identify the impact of competition on financial stability and performance measures, a two-way fixed effect regression model is estimated for bank i at time t as:

$$Y_{it} = B_i + T_t + \alpha Y_{it-1} + \gamma_1 LI_{it} + \gamma_2 {LI_{it}}^2 + \beta X_{it} + \delta C_{dum} + \epsilon_{it} \tag{4}$$

where Y_{it} denotes the response variables such as logarithm of z-score, return on assets, return on equity, volume of ag loan and ag loan ratio. Similarly, LI_{it} represents the Lerner index, X_{it} represents other bank level controls (logarithm of total assets, loan loss provision to asset ratio, deposit to loan ratio and non-interest income to interest income ratio) and C_{dum} denotes the crisis dummy. The year fixed effects (T_t) captures temporal variation. The bank fixed effects (B_i) account for bank level unobserved heterogeneity. Robust standard errors are clustered at the bank level.

Conclusions

The key results suggest that an increase in market power in the U.S. banking sector has led to a U-shaped effects on the probability of default, and an inverted U-shaped effect on volume and proportion of agricultural loans in agricultural banks. It implies that increased competition in a competitive agricultural banking environment has increased the probability of a bank failure, reduced the supply of farm loans and reduced the proportion of agricultural loans to total loans. In contrast, an increase in competition in more concentrated agricultural banking market has reduced the probability of bank failure, increased agricultural lending and increased the share of farm loans to total loans. Results also suggest that lower concentration in agricultural banking environment has increased bank profitability.

References

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