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GROWTH IN AGRICULTURAL LOAN MARKET SHARE FOR ARKANSAS COMMERCIAL BANKS

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Abstract

Changes in commercial bank market shares of farm debt are decomposed into portfolio decisions, loanable funds availability, and loan market size for 64 counties in Arkansas from 1986 through 1990. A seemingly unrelated regression model is hypothesized to identify county characteristics that are related to changes in commercial bank market shares. Regression results indicate that county differences in economic activity, the relative risk associated with agriculture, farm structure, and regional location contributed to changes in commercial bank market shares. The results imply a market niche for rural commercial banks emphasizing agricultural loans in the presence of unlimited branch banking.

Commercial banks are currently the largest institutional lenders to the farm sector and have dramatically increased their market share of total farm debt since 1981. Factors influencing changes in market share over time and across regions in Arkansas are identified in this study. The extent to which changes in commercial bank lending to agriculture are associated with county economic, demographic and structural characteristics are investigated.

Previous studies concerned with changing market share of nonreal estate farm debt are summarized in Wilson and Barkley (WB). Like WB, the study presented here is interested in explaining changes in commercial bank market share over time (1986-1990) and across regions as opposed to changes that are the result of macroeconomic effects. However, the study presented here differs from WB's in several ways. First, WB analyzed differences in changing market share across states, whereas the study presented here analyzes differences in changing market share across counties, and therefore, at a less aggregated level. Second, since the present study analyzes changes in commercial bank market share for one state, Arkansas, differences in banking regulations among states need not be considered here, although structural differences between rural and urban counties are. Third, WB explained changes in commercial bank market share of nonreal estate farm debt as opposed to total (nonreal estate plus real estate) farm debt as is done here. Fourth, WB explained changes in commercial bank market share during a period of declining market share, whereas the study presented here considers a period of commercial bank market share growth. Finally, the present study uses a more efficient estimator than WB to evaluate changes in commercial bank market share.

The increase in the national, total farm loan market share by commercial banks is primarily the result of an increase in real estate farm debt held by commercial banks. Other lenders' farm real estate loan portfolio decreased. More stringent loan collateral requirements have increased the use of commercial bank revolving lines of credit backed by real estate. Hence, the increased collateral

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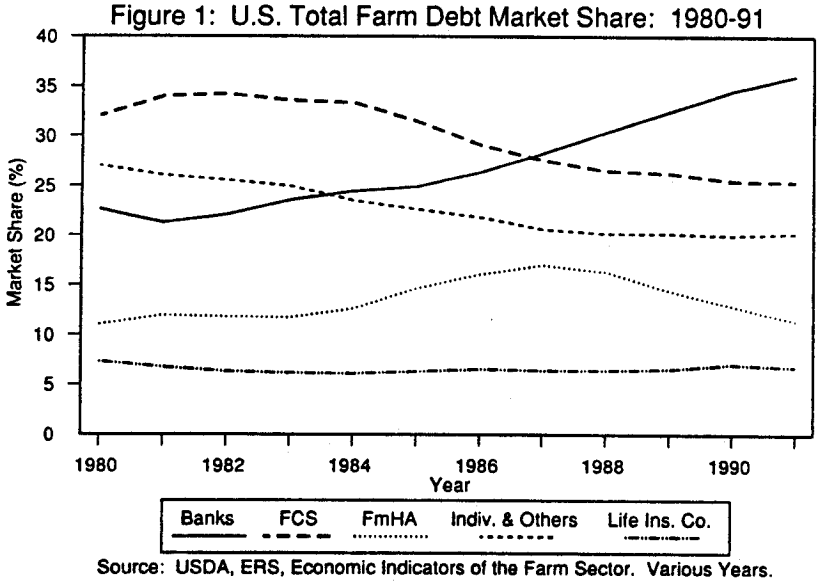
requirements have shifted loans into the real estate category even though the loans may be for nonreal estate purposes (USDA, 1991).[2] As a result, this study does not differentiate between nonreal estate and real estate farm debt as did WB since categorical differences have diminished.

The farm debt owed to the five major U.S. farm lender categories - commercial banks, Farm Credit System (FCS), Farmers Home Administration (FmHA), life insurance companies and individuals and others - has dramatically declined from a 1983 peak of $205,400 million to $146,982 million in 1991, or a 28 percent decline (USDA, 1992). The bulk of the decline is attributable to the FCS, FmHA and individuals and others while commercial banks experienced a net increase in farm loans. As a result, the market share of individual lender categories varied throughout the 1980s. For example, commercial banks, currently the largest agricultural lender, increased market share from a low of 21 percent in 1981 to a high of 36 percent in 1991 while the FCS lost market share from its peak of 34 percent in 1982 to 25 percent in 1991 as shown in Figure 1. The FmHA market share increased from 11 percent in 1980 to 17 percent in 1987 before retreating to 11 percent in 1991. Individuals and others decreased their market share continuously during the 1980s from 27 percent to 20 percent before experiencing modest gains since 1990, and life insurance companies' market share remained stable at approximately seven percent. Figure 2 demonstrates that Arkansas agricultural lenders experienced a similar pattern of changes in farm debt market share (Priyanti).

Figure 1: U.S. Total Farm Debt Market Share: 1980-91



Source: USDA, ERS, Economic Indicators of the Farm Sector. Various Years.

The study is organized as follows. The first section reviews the regulatory environment for agricultural lending in Arkansas. The second section discusses the methodology, model, estimation approach and data used. The following section presents and interprets the estimated model. Finally, concluding comments are presented.

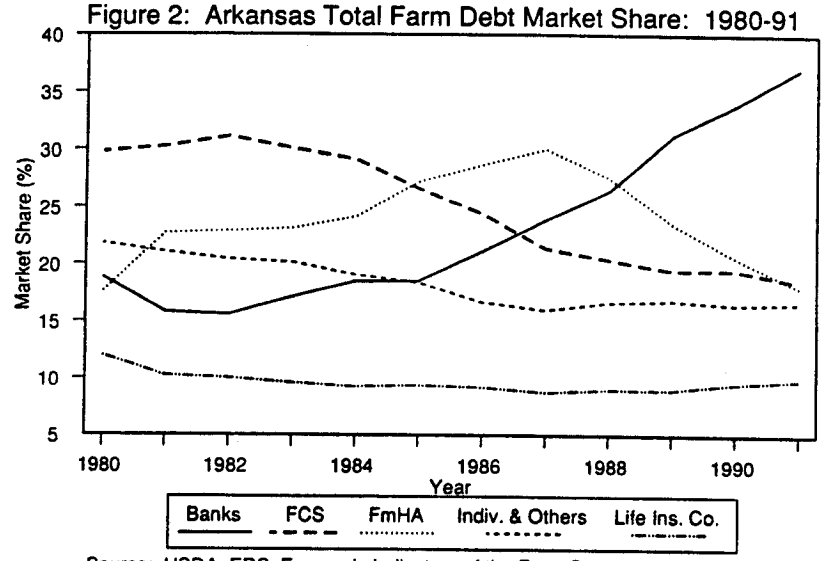
Agricultural Lending Environment in Arkansas

The regulations governing bank operation can have a sizable impact on banks' market share of a particular type of loan. Wilson and Barkley considered differences in the structure of

[2] Farm debt is categorized by loan security, not loan purpose. For example, a loan secured by a real estate mortgage will be categorized as real estate farm debt even though the loan funds are used for nonreal estate purposes.

bank systems (unit versus branch banking) among states in their study. Although bank regulations did not vary from county to county in the study presented here, regulatory changes during the 1986 through 1990 study period were considered. In 1988 legislation was passed to allow county-wide branch banking as of January 1, 1989, branch banking to contiguous counties as of January 1, 1994 and state-wide branch banking as of January 1, 1999. The relaxing of branch banking regulations to county-wide branch banking had a minimal, if any, affect on the commercial bank market share of agricultural loans for this study since market share data were aggregated to the county level and much of the county-wide branch banking occurred after the end of the study.

Figure 2: Arkansas Total Farm Debt Market Share: 1980-91



Source: USDA, ERS, Economic Indicators of the Farm Sector. Various Years.

Arkansas usury limits since 1982 have been the Federal discount rate plus 500 basis points. Although one of the most restrictive usury laws in the United States, the law has had a minimal impact on the number of agricultural loans banks grant. From a survey of western Arkansas bankers, Dixon, Ahrendsen and Barry found that few additional agricultural loans would be granted without usury. While usury constrains the amount of loan risk pricing a bank may undertake, FCS, for example, is not subject to usury and may risk price marginal loans. However, FCS has been interested in high-quality loans which have not required risk premiums. Thus, usury has likely had a minimal, if any, impact on market share during the study period.

Methodology and Data

Wilson and Barkley developed a model to explain changes in market share over time. In this paper their methodology is used to analyze the market share of Arkansas commercial banks for the aggregate of nonreal estate and real estate agricultural loans. First, the percentage change in commercial bank market share is decomposed into percentage changes in portfolio decisions, loanable funds availability and loan market size. Next, the changes in the components of market share are explained by exogenous factors in a seemingly unrelated regression framework.

Model Structure

Following WB, commercial banks' market share of agricultural loans can be expressed as:

$$\begin{aligned} MS &= BAL/TAL \\ &= [(BAL/BD)^{*}BD]/TAL, \\ &= ALDR^{*}BD/TAL, \end{aligned} \qquad (1)$$

where MS is commercial banks' market share of agricultural loans, BAL equals total bank agricultural loans, TAL is total agricultural loans outstanding, BD represents total bank deposits and ALDR is the agricultural loan-to-deposit ratio for commercial banks. Totally differentiating (1) yields:

$$dMS = [d(ALDR)*BD/TAL]+[ALDR*d(BD)/TAL]-[ALDR*BD*d(TAL)/TAL^3]. \quad (2)$$

By dividing (2) by (1), rearranging terms and multiplying by 100, a percentage change in commercial banks' market share can be expressed as:

$$\begin{aligned} 100*dMS/MS &= 100*[d(ALDR)/ALDR + d(BD)/BD - d(TAL)/TAL] \\ PCMS &= PCALDR + PCBD - PCTAL, \end{aligned} \quad (3)$$

where

100*d(ALDR)/ALDR = PCALDR = the percentage change in the agricultural loan-to-deposit ratio (portfolio decisions),

100*d(BD)/BD = PCBD = the percentage change in bank deposits (loanable funds availability), and

100*d(TAL)/TAL = PCTAL = the percentage change in total agricultural loans outstanding (loan market size).

The percentage change in agricultural loan-to-deposit ratio (PCALDR) measures the change in the portfolio decision of a commercial bank. Commercial banks service all sectors of the economy, and a decision must be made as to what proportion of the loan funds will be allocated to agricultural borrowers, other businesses, consumers or industry. In addition, commercial banks must allocate deposits among loans and alternative investments such as government securities, municipal bonds, agency bonds and reserves.

The percentage change in bank deposits (PCBD) measures the change in fund availability. Commercial banks have relied extensively on local deposits as the principal source of funds to finance their assets. In some periods growth in local deposit volume, particularly for rural banks, has not kept pace with the growth in aggregate demand for loans. However, there are sources of funds from outside the local deposit market that banks may access such as loan participation with correspondent banks, the seasonal borrowing privilege from Federal Reserve Banks and loan origination for The Federal Agricultural Mortgage Corporation (Farmer Mac) and other secondary markets. Thus, a rural bank may not have sufficient local funds to meet its goals in agricultural lending, but funds can be made available from other sources.

Loan participations are quite common among banks. In fact, Arkansas Bankers Bank was chartered in 1990 for the sole purpose of providing these and other correspondent banking services. However, the seasonal borrowing privilege and Farmer Mac have been utilized to a much lesser extent. The seasonal borrowing privilege, which has been in existence since 1973, was used by no more than 20 percent of the banks in Arkansas in any given year from 1985 through 1990 (Clark). Activity in the Farmer Mac secondary market by banks in Arkansas was negligible during the sample period. One reason for the past and current limited use of Farmer Mac is that banks have had sufficient funds available to finance their assets.

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[3] BANK may also be a proxy for urbanization (MSA) or change in the number of farms relative to total population (POP). However, multicollinearity diagnostics indicated a nonharmful level of collinearity.

The percentage change in total agricultural loans outstanding (PCTAL) indicates the changes in loan market size, lending activities of all lenders and overall demand for farm loans. Thus, PCTAL indicates the change in relative volume of farm loans.

System of Equations

Equation (3) is an identity because it is derived from (1) which is a definition. The WB approach explains variation in market share by explaining the variation in PCALDR, PCBD and PCTAL. Each of the three components of change can be modelled as a dependent variable to yield a system of three equations such as:

$$PCALDR_i = a_0 + a_1\, PCNFI_i + a_2\, PCFI_i + a_3\, RISK_i + a_4\, POP_i + a_5\, BANK_i + a_6\, MSA_i + e_i \quad (4)$$

$$PCBD_i = b_0 + b_1\, PCNFI_i + b_2\, PCFI_i + b_3\, POP_i + b_4\, BANK_i + b_5\, PCUN_i + b_6\, MSA_i + u_i \quad (5)$$

$$PCTAL_i = c_0 + c_1\, PCFI_i + c_2\, POP_i + c_3\, PCSIZE_i + c_4\, PCVAL_i + c_5\, MSA_i + v_i \quad (6)$$

where $PCALDR_i$, $PCBD_i$ and $PCTAL_i$ are the observations on the percentage changes for the i^{th} county.

The independent variables in (4) - (6) are defined in Table 1. These variables represent the demand for agricultural loans, demand for nonagricultural loans, the relative risk associated with agricultural lending, bank competition, farm structure and bank location.

Table 1. Definitions of Independent Variables used in Model Specification

Variable	Definition
PCNFI	Percentage change in nonfarm income (%)
PCFI	Percentage change in farm income (%)
RISK	Ratio of the coefficient of variation in nonfarm income to the coefficient of variation in farm income
POP	Ratio of the percentage change in the number of farms to the percentage change in population
PCUN	Percentage change in unemployment rates (%)
BANK	Number of banks in the county in 1990
PCSIZE	Percentage change in average farm size (%)
PCVAL	Percentage change in the value of land and buildings (%)
MSA	Dummy variable for metropolitan statistical area (urban area) (1-urban, 0=otherwise)

The variables selected to explain changes in the demand for agricultural loans are the percentage change in farm income (PCFI) and the ratio of the percentage change in the number of farms to the percentage change in total population (POP). The demand for nonagricultural loans is captured by the percentage change in nonfarm income (PCNFI) and the percentage change in the unemployment rate (PCUN). These variables are demand shifters.

It is hypothesized that PCFI is positively related to the PCALDR, PCBD and PCTAL. As farm income increases, farming is more profitable and farmers are more likely to demand farm loans to finance farm investments as well as having more funds to deposit. POP as a local market demand variable is also expected to be positively related to the three dependent variables. The change in the number of farms relative to total population indicates the change in the relative demand for agricultural loans by farmers in the county. The PCNFI is expected to be negatively related to PCALDR and positively related PCBD. As nonfarm income increases, demand for nonfarm loans (commercial and consumer) and bank deposits increase. In addition, PCUN as an indicator of the growth of a county's economic vitality is hypothesized to be negatively related to PCBD.

In equation (4), RISK measures the risk associated with nonfarm loans relative to farm loans. RISK is the ratio of the coefficient of variation of nonfarm income to the coefficient of variation of farm income. Commercial banks are concerned with the risk associated with their loan portfolios and, thus, the underlying variation in nonfarm income and farm income. Commercial banks can diversify their loan portfolios by lending to different sectors of the economy, but certain sectors may be more risky than others. As this risk differential increases, a banker must reevaluate the loan portfolio and make adjustments. Hence, RISK is expected to be positively related to PCALDR since increases in farm income risk, ceteris paribus, make RISK decline.

The degree of bank competition is measured by the number of banks per county (BANK). This measure assumes farmers have uniform access across Arkansas to other agricultural lenders such as the FCS.

Changes in the size and structure of farms are reflected by the percentage change in average farm size (PCSIZE) and the percentage change in the value of land and buildings (PCVAL). These two variables are related to the changes in real estate and fixed asset purchases, which should be positively related to PCTAL.

A measure of the diversification opportunities for a commercial bank is the degree of a county's rurality. A rural county is likely to have a large proportion of agricultural loans to total loans. The U.S. Office of Management and Budget designates ten Arkansas counties as metropolitan statistical areas (MSAs): Washington, Crawford and Sebastian in northwest Arkansas; Faulkner, Saline, Pulaski, Lonoke and Jefferson in central Arkansas; Crittenden in eastern Arkansas; and Miller in southwestern Arkansas. In this study, MSA is a binary variable taking on a value of one if an observation comes from one of these 10 urban counties, and zero otherwise.

The coefficients in (4) - (6) are estimated using Zellner's seemingly unrelated regression (SUR) as opposed to ordinary least squares which was used by WB. SUR is used to gain more efficient estimates since the error terms (e_i, u_i and v_i) in these different equations are likely to reflect some common unmeasurable or omitted factors and, therefore, are contemporaneously correlated (Judge, Hill, Griffiths, Luthkepohl, and Lee). SHAZAM (White, Wong, Whistler, and Haun) is used to obtain all estimates.

Data and Sources

The data used to construct variables are drawn from several sources: U.S. Department of Commerce, Bureau of Economic Analysis (PCNFI, PCFI, POP, RISK); the Federal Deposit Insurance Corporation Call Reports of Income and Condition (PCALDR, PCBD, BANK); the FmHA State Office in Little Rock and the Farm Credit Bank of St. Louis (PCTAL); Arkansas State and

County Economic Data of the University of Arkansas at Little Rock (PCUN); and the Arkansas Agricultural Statistical Service (POP, PCVAL, PCSIZE).

The sample is a cross-section with one observation per county. The percentage change variables compute the percentage change from 1986 to 1990 except for PCVAL, PCSIZE and the numerator of POP which are from 1982 to 1987. Because Arkansas has 75 counties, there are 75 observations (n=75) for the model. All dollar values and percentage changes are based on real dollar figures (Consumer Price Index, 1982 = 100). The bank financial information is based on the fourth quarter call reports as of December 31, 1986 and December 31, 1990 for 256 commercial banks aggregated to their respective county level.

Initially, SUR was used on the full sample with all 75 counties to estimate (4) - (6). Results indicated a general lack of significance of the three equations at the one and five percent levels. The R^2s of the regression equations were also low, approximately seven percent, respectively, for each equation. In addition, only a few of the individual parameters were statistically different from zero. As a result of the unsatisfactory results, outlier identification (discussed below) and other diagnostic procedures (discussed later) were performed to assess the reliability of the model.

Eleven counties were identified as statistical outliers. These counties were Boone, Calhoun, Cleveland, Columbia, Dallas, Grant, Hot Spring, Independence, Marion, Ouachita and Sharp. They were omitted from the sample used to estimate (4) - (6). The PCALDR for Cleveland County is undefined since this county reported no agricultural loans in 1986. Marion County had an extremely large RISK value (31.7). It is unreasonable to expect that the coefficient of variation in nonfarm income is thirty-one times larger than the coefficient of variation in farm income. The other nine outlier counties were detected by identifying counties whose residuals from the estimation of (4) exceeded twice their standard errors. This is a common method for identifying statistical outliers (Belsley, Kuh, and Welsch, p. 43). PCALDR was the most strongly correlated variable with PCMS compared with PCBD and PCTAL. Thus, the outliers were identified using equation (4).

Table 2 presents descriptive statistics of the variables used to estimate the model for the 64 observations remaining in the sample. The sample means for the dependent variables PCALDR, PCBD and PCTAL are 22.02 percent, 2.57 percent and -18.32 percent. Although the county average proportion of agricultural loans in commercial bank investment portfolios increased from 1986 to 1990, PCALDR has very large variation as indicated by a standard deviation of 45.36 percent. The positive mean of the PCBD indicates increased bank deposits, and hence, economic growth. The negative mean for the PCTAL implies that the total county-level agricultural loans have decreased from 1986 to 1990, which is consistent with the decline in Arkansas agricultural loans (Priyanti).

The means of the demand independent variables (PCNFI, PCFI, POP and PCUN) are 5.12 percent, 64.94 percent, 0.56 and -22.47 percent. The variability in nonfarm income is less than the variability in farm income, which is reflected by their standard deviations of 5.33 and 109.88 percent and their coefficients of variation of 1.04 and 1.69, respectively. This relative variability of nonfarm income to farm income is also reflected by RISK's mean of 0.7. A mean less than one indicates that, on average, nonfarm businesses have less income risk than farm businesses.

Summarizing the growth patterns, county economic activity in Arkansas increased from 1986 to 1990. In addition, farm income was more variable than nonfarm income. Since farm income in Arkansas is concentrated in rural counties, income variation is likely to be disproportionately concentrated in rural counties.

Table 2. Descriptive Statistics of the Variables Used[a]

Variables	Mean	Standard Deviation	Minimum	Maximum
PCALDR (%)	22.02	45.36	-46.88	258.92
PCBD (%)	2.57	12.06	-58.38	25.01
PCTAL (%)	-18.32	11.51	-46.27	13.64
PCNFI (%)	5.12	5.33	-6.49	16.63
PCFI (%)	64.94	109.88	-42.92	461.13
POP	0.56	5.55	-24.20	17.90
PCUN (%)	-22.47	17.86	-57.48	31.82
RISK	0.70	1.41	0.005	6.41
BANK	3.51	2.30	1.00	14.00
PCVAL (%)	-28.20	15.58	-52.53	21.34
PCSIZE (%)	3.03	9.07	-21.43	32.40

[a] Variable name definitions are presented in Table 1. Number of observations equals 64.

Results

Regression Diagnostics

In addition to identifying and eliminating outliers as discussed previously, testing procedures were carried out to detect violations of the underlying regression model assumptions. The diagnostic procedures included tests for multicollinearity, heteroskedasticity and a regression specification error test. See Priyanti for additional discussion of the tests and presentation of test results.

Multicollinearity diagnostics indicated the existence of potentially harmful levels of multicollinearity among the explanatory variables in each of the three equations. The variable PCFI was omitted from each equation and collinearity was consequently lessened to a nonharmful level. Omitting a relevant independent variable can bias the remaining coefficient estimates. However, the results of the RESET tests (Ramsey) indicate no significant misspecifications at the 0.05 level.

Homoskedasticity for the three component equations (4) - (6) is not rejected at the 0.01 significance level for each regression equation. Thus no steps are taken in the SUR approach to compensate for heteroskedasticity.

A preliminary specification was estimated with regional binary variables representing the rural coastal, delta and highland counties. However, the impact of these regions was not as significant as simply dividing Arkansas into rural and urban counties.

Final Estimation Results and Discussion

To obtain greater efficiency, equations (4) - (6) with $PCFI_i$ omitted were estimated by SUR using the sample with 64 observations. The implications of the estimated equations are now discussed.

Portfolio Decision (PCALDR)

The SUR estimates of equation (4) are shown in Table 3. The coefficient of determination (R^2) for PCALDR is 0.24. All parameter estimates are significantly different from zero at either the 0.10, 0.05 or 0.01 level.

Table 3. Seemingly Unrelated Regression Results of the Estimated Model (Variable PCFI Deleted, n=64)[a]

	Dependent Variables (equation)		
Variable Name	**PCALDR (4)**	**PCBD (5)**	**PCTAL (6)**
Constant	35.134***	0.422	-10.071***
	(10.328)	(3.219)	(2.780)
PCNFI	2.202*	0.524*	[b]
	(1.162)	(0.302)	
RISK	-8.928**	[b]	[b]
	(3.998)		
POP	2.584***	-0.289	0.531**
	(0.964)	(0.271)	(0.234)
PCUN	[b]	0.059	[b]
		(0.082)	
PCSIZE	[b]	[b]	0.095
			(0.155)
PCVAL	[b]	[b]	0.252***
			(0.089)
BANK	-4.211*	0.501	[b]
	(2.450)	(0.666)	
MSA	-46.511***	-5.151	-10.562***
	(15.827)	(4.652)	(3.630)
F-test	3.344[c]	1.154	4.182[c]
R^2	0.236	0.090	0.217

[a] Standard errors are in parentheses.
[b] Variable not included in regression equation.
[c] F-test is significant at the 0.01 level.

* Two-tailed t-test is significant at the 0.10 level.
** Two-tailed t-test is significant at the 0.05 level.
*** Two-tailed t-test is significant at the 0.01 level.

The coefficient estimate of percentage change in nonfarm income (PCNFI) is unexpectedly positive and significant at the 0.10 level. A similar unexpected result was found by Pederson. It was expected that increases in nonfarm income would indicate increased demand for nonagricultural loans, implying a decrease in the agricultural loan-to-deposit ratio. In addition, commercial banks may prefer to lend more to nonfarm activities since repayment capacity is likely to increase because of increases in nonfarm income.

However, a positive relationship between PCNFI and PCALDR can be explained. Suppose nonfarm income is not growing as fast as farm income. Then commercial banks may choose to lend to sectors with the highest rate of income growth. This may be true for Arkansas, since average county farm income grew 65 percent, compared with the five percent growth in average county nonfarm income during the study period.

PCNFI also is significantly and positively related to PCBD in equation (5). This implies increases in nonfarm income increase bank deposits. If the best lending opportunities are in agriculture and there are limited lending opportunities in other sectors, then commercial banks would invest the additional bank deposits in farm loans, which results in an increase in the agricultural loan-to-deposit ratio.

The sign of the RISK coefficient in the PCALDR equation is unexpectedly negative and significant at the 0.05 level. Wilson and Barkley's risk variable was not significantly related to PCALDR. The negative parameter estimate on the RISK variable implies that the agricultural loan-to-deposit ratio rises with increases in relative risk of farm business income. This counterintuitive result can be explained by a number of reasons.

Arkansas is primarily characterized by rural areas and these depend more on the agricultural economy than urban areas. Rural banks experience high risks in agricultural lending primarily as a result of variability in farmers' incomes and limited opportunities for asset diversification. Since farm income growth during the study period exceeded nonfarm income growth, commercial banks, especially in rural areas, may have chosen to invest in risky assets like agricultural loans because the fast growth in farm income may be associated with expected high agricultural profits.

Robison and Barry cite a survey conducted by the American Bankers Association that identified bankers' probable changes in the agricultural loan-to-deposit ratio if farm lending became more risky. Only 38 of 119 bankers responding to the survey indicated a likely reduction in farm lending, and 24 bankers indicated an increase in farm lending. Cross-checking of answers for other risk responses, such as increases in interest rates, security requirements and degree of supervision of farm loans, confirms lenders responding to risk in ways other than denying loans. As an example, of the 81 bankers who would not reduce farm lending, 48 reported they would increase interest rates on farm loans as a risk response. Unfortunately, data regarding such commercial bank risk responses are not available for the present analysis.

The proportion of the growth in the number of farms to growth in total population (POP) in each county is used as a proxy for agricultural loan demand relative to consumer loan demand. As expected, the coefficient estimate on POP is positive. Thus, counties having large growth in the number of farms relative to total population growth experienced greater growth in agricultural loan-to-deposit ratios than counties having small growth in the number of farms relative to total population growth. Bank officers and loan committees made decisions to support the greater agricultural loan demand in those counties. This result is consistent with the results found by WB and Betubiza and Leatham.

A proxy for bank competition is measured by the number of banks in each county in 1990 (BANK). The negative parameter estimate on BANK implies that as there are more banks in a county, the agricultural loan-to-deposit ratio decreases. Counties with more banks probably experienced greater opportunities for loan diversification from 1986 to 1990 than did counties with fewer banks. Thus, banks facing greater within-county competition lowered their emphasis on agricultural lending.

The negative parameter estimate for urban areas (MSA) indicates urban commercial banks increased their agricultural loan-to-deposit ratio at a much slower rate, or decreased their agricultural loan-to-deposit ratio (de-emphasized agricultural lending) at a much faster rate, than

rural commercial banks. This is not surprising because the more urban an area, the more diverse are the lending opportunities. Thus, commercial banks appear to diversify out of agriculture as long as diversification opportunities are available. Moreover, rural banks are more likely to lend more money to agriculture relative to their deposits than urban banks do because rural banks are more dependent on farm activities. Another reason for the inverse relationship between PCALDR and MSA may be that urban bank management has not maintained the past levels of agricultural lending expertise and commitment to agriculture.

Loanable Funds Availability (PCBD)

SUR coefficient estimates of equation (5) explaining variation in percentage change of bank deposits (PCBD) have only one coefficient significant at 0.10, that of percentage change in nonfarm income (PCNFI). The coefficient of determination for the PCBD equation is 0.09. Additional analysis shows that variation in PCBD explains relatively little variation in PCMS compared with PCALDR. Thus the lack of regressor significance is not particularly troublesome for this study.

Loan Market Size (PCTAL)

All of the SUR coefficient estimates in (6) explaining variation in percentage change of total agricultural loans (PCTAL) are significantly different from zero at either the 0.05 or 0.01 level except the coefficient of PCSIZE. Also, the coefficient estimates have their anticipated signs. The coefficient of determination for the PCTAL equation is 0.22.

Growth in number of farms relative to a county's population is represented by the POP variable. The positive parameter estimate on POP indicates that the greater the percentage change in the number of farms relative to the percentage change in the total population, the higher the percentage change in total agricultural loans outstanding. Thus, a relatively large decrease in the number of farms in a county indicates that the agricultural sector has become a less important part of the county's economy and that there is less demand for agricultural loans.

The overall decrease in loan market size from 1983 through 1990 is consistent with the general perception of weak farm loan demand during the last few years of this period. Farm loan demand was weak because farmers, in general, were concerned with decreasing their debt levels and were perceived to be more risk averse regarding debt. Weak farm loan demand affects all lenders, and thus, the total loan market size is reduced.

The positive parameter estimate on PCVAL indicates that increases in farmland and property values are associated with higher agricultural loans outstanding. Betubiza and Leatham showed that a farm located in an area with higher farmland and property values has greater collateral value, and thus, a farm can support a higher level of loans. An increase in property values, ceteris paribus, decreases the financial risk of the firms so that lenders are likely to grant more loans and farmers are likely to request more loans.

The negative parameter estimate for urban areas (MSA) implies that urban areas experienced larger declines in total agricultural loans outstanding than did rural areas. Urban areas are characterized by large financial institutions that can lend to many businesses in a variety of industries. Therefore, the relatively small concentration of farm loans among large urban financial institutions may reflect an opportunity for these institutions to lend to nonfarm business. This reasoning is supported by the evidence presented by Barkley, Mellon and Potts; and Gilbert and Belongia. Other possible explanations for the inverse relationship between PCTAL and MSA are: significant levels of urban growth displace agriculture in urban counties; and just as with the relationship of PCALDR to MSA, urban bank management may not have maintained their historical level of agricultural lending expertise and commitment.

Concluding Comments

Changes in commercial bank market shares of farm debt were decomposed into portfolio decisions, loanable funds availability and loan market size. In general, commercial banks increased the proportion of agricultural loans in their portfolio. Commercial banks had ample loan funds available to service the demand for farm debt. Decreased loan market size, primarily a result of decreased loan demand by farmers, affected all agricultural lenders, but commercial banks were affected to a lesser extent than other lenders.

Factors affecting the three components (portfolio decision, loan funds availability and loan market size) of percentage change in commercial banks' market share were identified. The percentage change in nonfarm income had a significant impact on the changes in the agricultural loan-to-deposit ratio as well as total bank deposits. Since nonfarm income growth was slower than farm income growth, bank management invested more money in agriculture by granting more agricultural loans. Hence, the agricultural loan-to-deposit ratio increased even though farm income was more variable than nonfarm income. Results demonstrate that the growth in the number of farms relative to total population growth in an Arkansas county had a significant impact on the changes in the agricultural loan-to-deposit ratio as well as loan market size. This implies that structural and demographic effects have an impact on the demand for agricultural loans. In addition, the decrease in agricultural asset values was associated with decreased loan market size because less collateral was available to secure loans and lower credit reserves were available for farmers while at the same time increasing financial risk. Also a county being urban led to lower agricultural loan-to-deposit ratio levels and lower total agricultural loans from 1986 to 1990 than a county being rural.

While the variation in bank deposit changes was not strongly associated with hypothesized regressors, changes in deposit availability explained little of the market share variation. The secondary markets for farm real estate and rural housing mortgages (Farmer Mac I) and FmHA guaranteed portions of operating and farm ownership loans (Farmer Mac II) diminish the dependency of commercial banks on bank deposits as a source of loan funds. However, loan funds availability has not been a limiting factor in the growth of commercial banks market share of farm loans. Commercial banks have other options available, such as loan participations and the seasonal borrowing privilege, that allow them to have adequate funds available to satisfy loan demand. Thus, the success of Farmer Mac appears to depend more on lenders' need to reduce risk than to increase liquidity by selling loans in the secondary market.

The deregulatory trend toward unlimited branch banking in Arkansas and other states may have an impact on commercial banks' market share of farm loans. Gilbert and Belongia; and Lawrence and Klugman have found that rural banks controlled by urban-based banks have proportionately few agricultural loans. Similarly, the study presented here provides significant evidence that a commercial bank located in an urban county has a propensity to grant fewer agricultural loans than a commercial bank located in a rural county. Possible explanations for these results are: rural banks controlled by urban-based banks have more opportunities for loan diversification and urban management may not feel it has sufficient expertise in agricultural lending. Given these results and explanations, to the extent that unlimited branch banking will be dominated by urban-based banks and their lending practices, branch banks associated with the urban banks may grant fewer agricultural loans relative to other loans in rural areas. This might portend a market niche for rural commercial banks emphasizing agricultural loans.

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