Effects of Banking Structure on the Allocation of Credit to Nonmetropolitan Communities

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Recent and proposed legislative changes encourage increases in multioffice banking activity. In this manuscript, the allocation of credit to nonmetropolitan communities in a branch banking state (Arizona) is compared to that in a unit banking-holding company state (Colorado). Rapidly growing nonmetropolitan areas have experienced increased lending activity under statewide branching relative to unit banking. Rural communities, which experienced slow or negative growth, had lower loan-to-deposit ratios under branch banking than might have existed under unit banking. Therefore, conversion to branch banking may result in a reallocation of loanable funds within nonmetropolitan areas.

The liberalized Edge Act Corporation activity allowed by the International Banking Act of 1978, the Garn-St. Germaine Act of 1982, and proposed changes in the McFadden Act indicate a willingness on the part of Congress and the President to permit increased multioffice banking activity. If additional deregulation occurs and the geographic restrictions on bank operations are relaxed, the structure of many nonmetropolitan banking markets is likely to change. This paper investigates the impact of increased multioffice banking activity on the allocation of credit to rural communities. Specifically, we address the issue of whether or not branch banking results in a diminution of funds available to nonmetropolitan residents and businesses.[1]

The relative ease of moving funds among branch offices and the nonlocal characteristic of bank ownership and management are the principal reasons that branch banks may transfer the deposits of rural savers to urban loan markets more readily than unit banks. However, the potential for relatively low cost transfers of funds does not imply that bank credit to nonmetropolitan areas is reduced under a statewide branching system, because rural to urban flows may coexist with a greater loan volume for the local community. Nonmetropolitan unit banks are usually smaller than branch banks and less able to reduce risk through diversification and a broad deposit base. Instead, unit banks reduce portfolio risk through lessened loan activity (Edwards; Horvitz and Shull; McCall; Verbrugge). Thus, branch offices

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The authors gratefully acknowledge the contributions of Eric Monke, the editor and anonymous *Journal* reviewers. Appreciation is also extended to the bankers of Arizona for their efforts undertaken to provide branch office specific data. This article summarizes some of the findings of a project funded by the Arizona Agricultural Experiment Station under Regional Project W-165.

[1] Throughout this article, metropolitan and urban refer to Standard Metropolitan Statistical Areas (SMSAs). Alternatively, rural and nonmetropolitan will be used interchangeably to refer to non-Standard Metropolitan Statistical Areas (non-SMSAs).

Western Journal of Agricultural Economics, 9(2): 283–292

may allocate relatively more credit to rural areas than a single office bank.

Numerous studies have attempted to determine if multioffice banking organizations transfer funds from nonmetropolitan to metropolitan branch offices, and if so, whether these interbranch flows result in less credit granted to rural areas than would have been provided under a unit banking system.[2] This research has demonstrated that branch banking organizations make proportionately more loans than unit banks, and thus, the results do not support the contention that branch banks siphon funds from rural to urban markets. However, two related data problems have limited the strength of these earlier studies' conclusions. First, prior research has not used branch office specific data. More commonly, bank organization data were utilized, and this aggregation may be masking some important allocational effects.[3] Second, local bank data may not represent local lending activity. For example, loan participation by a bank could result in more or less credit extended in a community than is listed on the books of the local bank.

In this paper, the 1977–80 lending behavior of nonmetropolitan banks in a predominantly unit banking state (Colorado) and rural branch bank offices in an unlimited branching state (Arizona) are compared.[4] Arizona has a highly concentrated, statewide branching system with only 10 banks (144 bank offices) serving the state's rural residents in 1980. In 1980, the three largest banks in Arizona controlled 85 percent of the state's deposits and 120 of the nonmetropolitan branch offices, making Arizona the second most concentrated state banking system in the nation. In contrast, Colorado had 422 unit banks (151 in nonmetropolitan counties) but only 40 percent of the state's deposits were controlled by the three largest banks. Although Colorado banking statutes permit multibank holding companies, rural bank participation in these holding companies was not widespread. Only 25 of the 151 nonmetropolitan banks were members of multibank holding companies in 1980.[5]

Loan-to-Deposit Ratio Analysis

The Arizona branch banking data used in this analysis are unique. The data represent the 1977 through 1980 year-end totals for demand deposits, time and savings deposits, and outstanding loans for each branch office. The loan and deposit data for the individual rural bank offices of Arizona's branch banks were provided by the home office of each branch bank. All of

[2] The literature regarding bank structure is extensive and the relevant articles are listed in the reference section. An excellent survey article has been written by McCall.

[3] Noteworthy exceptions to the past research are two studies by researchers at the New York State Banking Department (Kohn and Carlo; Kohn *et al.*) in which the loan-to-deposit ratios of New York's branch bank offices and unit banks were compared. However, this intrastate comparison may be misleading since unit and branch banks may have their behavior influenced by the proximity to each other (see Horvitz and Shull).

[4] Colorado permits bank holding companies. However, with the exception of automated teller machines and common loan participation agreements, funds are not transferable among banks within a holding company. Moreover, recent studies found no significant difference between the overall loan-to-deposit ratios of affiliated and independent banks. Differential effects were limited to the composition of loan portfolios (Graddy and Kyle; Lee and Reichert). Our analysis of the Colorado data confirms this conclusion. For the time period of this study, the overall loan-to-deposit ratios for Colorado's affiliated and independent banks differed by no more than four percentage points. These results allow us to treat Colorado as a unit banking state.

[5] Colorado banking laws do permit each bank to have one branch. However, according to the Colorado Division of Banking, this branch must be located within 3,000 feet of the home office. Colorado also has industrial banks, financial institutions that function very much like credit unions. Thus industrial banks were not included in the Colorado sample.

Arizona's branch banks except the fifth largest provided data for their nonmetropolitan branches. Colorado unit banking data for the same period were available in *Polk World Bank Directories* and Federal Reserve Bank data tapes.

Bank loan-to-deposit ratio (LDR) is used as a proxy for relative loan activity. LDR or loan-to-asset ratios have been used by many authors (Edwards; Eisenbeis; Horvitz and Shull; Kohn and Carlo; Rhoades and Savage; Schweiger and McGee; and Kohn *et al.*), thus permitting comparisons of our findings with earlier studies. One shortcoming of LDR as a relative loan activity proxy is that bank office data may not accurately represent local lending activity. A community may receive more funds than indicated by local data if nonlocal banks participate in community loans. Alternatively, local bank data may include loans that are provided to residents and businesses of other communities. The Arizona data from individual branch offices is not subject to this shortcoming; branch banks reported loans and deposits for the specific community involved and cross-office loan participation was represented. The local *vs.* nonlocal problem does exist for the Colorado data. However, a recent survey of nonmetropolitan Wisconsin banks (Taff *et al.*) found relatively little loan participation activity. Therefore, if the portfolio management of nonmetropolitan Colorado's unit banks is similar to that for rural Wisconsin's unit banks, the error introduced by loan participation should be small.

A comparison of the statewide LDRs supports the hypothesis that large branch banks are more aggressively managed than the smaller unit banks (Table 1). With the exception of 1977, the banking system in Arizona had higher overall loan-to-deposit ratios than Colorado. Moreover, the data of Table 1 suggest that rural-urban transfers are more substantial in branch banking states. SMSA and non-SMSA population growth rates were almost identical within each state during this period.[6] Yet, the LDRs for metropolitan Arizona were higher than those of non-SMSA branch areas for three out of the four years. The reverse was true in Colorado. From 1977 to 1980, nonmetropolitan LDRs in Colorado were never less than the LDRs for the metropolitan counties.

TABLE 1. Aggregate Loan-to-Deposit Ratios by SMSA Classification, Arizona and Colorado, 1977–80.[a]

State and Year		Statewide	SMSAs	Non-SMSAs
1980	Arizona[b]	.722	.726	.700
	Colorado	.654	.647	.673
1979	Arizona	.722	.721	.722
	Colorado	.673	.665	.702
1978	Arizona	.718	.726	.672
	Colorado	.695	.690	.713
1977	Arizona	.679	.689	.629
	Colorado	.680	.679	.685
1977–80	Arizona	.712	.718	.685
	Colorado	.674	.669	.693

[a] The Aggregate LDRs for each classification were computed as $(\Sigma L_i)/(\Sigma D_i)$ where i represents individual banks or branch offices.

[b] Loan and deposit data for Arizona pertain only to the three largest banks excluding the Nogales, Arizona, branches.

Despite the apparent rural-urban transfer of loanable funds in Arizona, the state's nonmetropolitan communities did not experience a consistent decrease in lending activity. Arizona's nonmetropolitan LDRs exceeded those of nonmetropolitan Colorado for 1979 (.722 to .702) and 1980 (.700 to .673). However, in 1977 and 1978, rural Arizona's LDRs were smaller than those of nonmetropolitan Colorado (.629 *vs.* .685 and .672 *vs.* .713 respectively). Over the period 1977–80, the average LDRs for nonmetropolitan Colorado (.693) and

[6] The 1970 to 1980 population growth rates for metropolitan and nonmetropolitan Arizona were 54.2 percent and 49.7 percent, respectively. The 1970 to 1980 Colorado SMSA and non-SMSA population growth rates were 30.0 percent and 32.9 percent, respectively.

TABLE 2. Mean Loan-to-Deposit Ratios of Nonmetropolitan Banks by Community Population Growth Rate Classification, Arizona and Colorado, 1977–80.[a]

		Non-SMSA Communities' Growth Rates, 1970–80							
		Negative		0–24.9%		25–49.9%		50%+	
		Arizona[b]	Colorado	Arizona	Colorado	Arizona	Colorado	Arizona	Colorado
1980	Mean	.505	.627	.640	.665	.645	.655	.748	.645
	Variance	.061	.009	.073	.013	.098	.006	.234	.020
	Range	(.148–1.096)	(.473–.843)	(.240–1.038)	(.421–.969)	(.184–1.491)	(.422–.798)	(.157–1.940)	(.234–.928)
1979	Mean	.518	.686	.695	.692	.708	.694	.823	.660
	Variance	.053	.008	.098	.013	.075	.006	.257	.015
	Range	(.152–.980)	(.481–.808)	(.243–1.153)	(.356–.963)	(.231–1.240)	(.473–.887)	(.096–2.159)	(.294–.852)
1978	Mean	.523	.662	.671	.689	.696	.705	.634	.682
	Variance	.041	.016	.074	.015	.090	.007	.090	.016
	Range	(.183–.943)	(.383–.883)	(.267–1.154)	(.352–.972)	(.277–1.543)	(.513–.876)	(.088–1.270)	(.360–.880)
1977	Mean	.479	.620	.652	.680	.639	.679	.567	.631
	Variance	.028	.012	.060	.016	.082	.015	.075	.016
	Range	(.201–.809)	(.386–.822)	(.255–1.151)	(.383–.975)	(.163–1.460)	(.370–.980)	(.114–1.072)	(.368–.886)

[a] Mean LDRs for each cell were computed as $(1/n)(\Sigma L_i/D_i)$ where i represents individual banks or branch offices and n equals the total number of banks or branch offices in each cell. In 1980, the n values for the four growth rate categories (<0, 0–24.9, 25–49.9, 50+) were (29, 55, 36, 41) for Colorado and (15, 10, 27, 21) for Arizona.

[b] Loan and Deposit data for Arizona pertain only to the branches of the three largest banks, excluding Nogales, Arizona, branches.

nonmetropolitan Arizona (.685) were not significantly different.[7]

A disaggregation of the data by community growth rate categories (Table 2) indicates two important differences in the relative lending activity of branch offices and unit banks. First, the average LDRs of both Arizona's branch offices and Colorado's unit banks were positively correlated with local population growth rates. The positive relationship between LDRs and growth rates suggests that banks increased their lending in response to greater local investment opportunities. However, on the average, Arizona's nonmetropolitan branch offices were more responsive to changes in loan demand than were Colorado's unit banks. For example, in 1979, the mean Arizona LDRs were .518, .692, .708, and .823 for the four community growth rate classifications (<0, 0–24.9%, 25–49.9%, and 50%+). The average 1979 Colorado LDRs for the above growth rate categories were .686, .692, .694, and .660, respectively.[8] The second obvious difference in unit and branch bank lending activity is the greater variability of LDR values among Arizona branch offices relative to Colorado's unit banks. Regardless of year or community growth category, the range and variance of Arizona's LDRs always exceeded those reported for Colorado banks. Apparently, factors besides community growth rates are important in explaining bank LDRs.

The increased flow of funds between branch bank offices relative to unit banks is consistent with banking theory and earlier empirical studies. First, lending activity of small unit banks is constrained by their relatively low legal lending limits (typically 10 percent of capital and surplus) and their need to maintain a share of their assets in a highly liquid form, such as in U.S. Government Securities (Verbrugge). Branch banking organizations are also faced with legal lending limits and liquidity requirements. However, because branch banks are generally larger and more diversified, lending limits and liquidity needs are less restrictive for the branch banking organization as a whole, and of little consequence for individual branch bank offices. Second, branch banking systems can transfer excess funds from one local area to another more easily and economically than can a single office system (Blackwell). Finally, during tight money periods, a unit bank may experience more difficulty in acquiring and retaining funds from other banks than a branch office would experience in utilizing excess funds from other branches.

Specification of Regression Model

The differences in Arizona and Colorado LDRs may be attributable to factors other than branch banks' propensity to reallocate loanable funds. Multiple regression analysis is needed to correct for differences in local market conditions, bank specific management behavior, and community demographic and employment characteristics. The variables and their expected relationship to bank LDRs are presented below.

Local Market Conditions. Any number of local economic variables may influence a bank's lending behavior. The selection of two states with similar economies controls for some of these effects, but it is necessary to account for a few obvious differences among the states' nonmetropoli-

[7] The Nogales, Arizona, branch offices were not included in the sample because these facilities were very popular depositories for Mexican nationals during periods of peso devaluation. Loan-to-deposit ratios of these branches did not accurately reflect the availability of local credit.

[8] The decline in LDRs for the 50 percent and greater growth rate category may reflect a lag between community growth and bank lending. That is, for the very rapidly growing communities, deposits are increasing more rapidly than outstanding loans. Alternatively, the decline in LDRs may reflect a disproportionate representation of communities which attract retirees.

tan banking markets. First, rural bank LDRs should be positively related to the local market demand for loanable funds. The 1980 to 1970 population ratio (PR) for the local community is used as a proxy for loan demand. In addition, a quadratic term for population growth (PR^2) is included to account for a possible "diminishing return" effect. The coefficient on this variable is expected to be negative. Second, the economic vitality of the various communities is measured by growth of communities' per capita income (PCY) and the counties' unemployment rates (UN). Growth of community per capita income is hypothesized to be positively related to bank LDRs, while UN and LDR should be negatively related. Finally, the availability of alternative credit sources (other banks, savings and loan associations, industrial banks, and credit unions) may force banks to deviate from their preferred loan portfolios. The degree of competition is measured by the number of alternative credit sources in the community (CS). Other financial institutions will increase bank LDRs if these institutions serve as substitute depositories to a greater extent than they serve as substitute creditors. But if the reverse is the case, the existence of other credit courses will decrease bank LDRs. Thus, the relationship between CS and LDR is indeterminate *a priori*.

Management Behavior. The structure of a bank's liabilities is likely to influence the bank's willingness to acquire relatively illiquid assets (loans). Since time deposits generally pose less of a liquidity problem for banks than demand deposits, banks with relatively high time deposits-total deposits ratios (TDR) are expected to have relatively high LDRs. For Arizona's branch offices, TDR is the time deposit-total deposit ratio of the statewide branch banking organization. Membership in a multibank holding company (MBHC) may also influence the management behavior of Colorado unit banks. However, as noted earlier, few nonmetropolitan Colorado banks were affiliates of MBHC, and the LDRs of affiliated and independent nonmetropolitan banks did not differ significantly. Therefore, a variable indicating membership in an MBHC is not included.[9]

Demographic and Employment Characteristics. The age distribution of a community's residents is likely to influence local banks' LDRs, since the demand for loanable funds by the elderly is relatively low. The percent of the community population over age 65 (EP) is included to account for the impact of elderly population. Both Arizona and Colorado have nonmetropolitan communities with specilaized employment bases. If a community has a concentrated employment structure, credit needs may be quite different from areas with diversified economic bases. For example, mining and manufacturing concerns are less likely to be locally owned than businesses engaged in agriculture, service, and trade. Variables representing the proportion of local employment in mining (MN) and manufacturing (MFG) are included to account for the possibility that the credit needs of these firms are provided through nonlocal credit sources. The proportion of local employment in agriculture (AG) is also included in the estimation since credit needs of farmers and ranchers have increased greatly over the period of this study. This variable is hypothesized to be positively related to bank LDRs.

Bank Structure. The influence of bank structure on the relative flow of funds between slowly and rapidly growing communities is represented by three variables (BS, BS(PR), and $BS(PR^2)$). BS is a binary variable that takes on a value of one for Arizona banks and zero for Colorado

[9] The size of a bank may also be an important influence on management behavior. This variable was omitted from the analysis because it was highly correlated with bank structure.

banks. BS(PR) and BS(PR^2) indicate the interaction between bank structure-population growth rates. If branch banks (Arizona) were more responsive than unit banks (Colorado) to regional differences in loan demand, the coefficient of the BS(PR) variable will be positive.

Equation (1) represents the regression model used in the analysis:

$$\begin{aligned} ALDR = a_0 &+ a_1CS + a_2TDR + a_3PR \\ &\quad (?) \quad (+) \quad (+) \\ &+ a_4PR^2 + a_5EP + a_6MN + a_7MFG \\ &\quad (-) \quad (-) \quad (-) \quad (-) \\ &+ a_8AG + a_9PCY + a_{10}UN + a_{11}BS \\ &\quad (+) \quad (+) \quad (-) \quad (?) \\ &+ a_{12}BS(PR) + a_{13}BS(PR^2) + e \qquad (1) \\ &\quad (?) \quad (?) \end{aligned}$$

where ALDR = average bank loan-to-deposit ratios for Arizona and Colorado banks, 1977–80. The hypothesized signs for each coefficient are provided below the variable names.

Empirical Results

The results of our regression analysis are presented in Table 3.[10] All of the statistically significant variables had the anticipated signs. The number of alternative credit sources and growth in per capita income were directly related to bank lending activity—the greater the local market competition and the healthier the local economy, the higher the bank LDR. The time deposit ratio was also positively related to LDR and highly significant, conforming to the expectation that a longer term structure of liabilities permits a bank to decrease the liquidity of its assets. Banks or branch offices, located in communities which attract retirees, experienced relatively low demand for loanable funds. Most of the variables depicting the employment characteristics of the communities (MN, MFG, AG) had the anticipated signs, but none of the coefficients were significant at the 10 percent level. The failure to find a significant relationship between employment structure and bank LDRs may be attributable to the use of county employment statistics instead of community employment data. Unexpectedly, UN was positively related to bank LDR, although the coefficient was not significant at the 10 percent level.[11]

The impact of bank structure on the allocation of credit to nonmetropolitan communities is indicated by the five growth rate and bank structure variables (PR, PR^2, BS, BS(PR), BS(PR^2)). The insignificant coefficients on PR and PR^2 in conjunction with significant coefficients for BS(PR) and BS(PR^2) imply that the LDRs of Colorado's unit banks were not affected by local population growth rates. This relationship is illustrated in Figure 1 by a linear function with a slope of zero and intercept $\bar{C}$ (the mean Colorado LDR). In contrast, the significant coefficients on the BS, BS(PR), and BS(PR^2) variables imply that the LDR of Arizona's branch banks was a function of community growth rates. The coefficient of the BS variable represents the difference between the intercept values of the Colorado and Arizona LDRs. Thus, the LDR of Arizona's rural branch banks will be .403 less than Colorado's mean LDR when PR equals zero (a possibility only for ghost towns). The coefficients on the BS(PR) and BS(PR^2) variables indicate that Arizona LDRs were responsive to changes in community growth rates. Arizona bank LDRs in-

[10] The R^2 of the regression equation (.153) is low, as is generally the case for cross-sectional banking studies. However, unless the low R^2 results from omitted variables that are highly correlated with the included independent variables, the results are unbiased.

[11] Bank structure was correlated with the county unemployment rate; however, the removal of this variable from the regression equation had no effect on the coefficients or t-values of the bank structure variables.

TABLE 3. Effect of Bank Structure on Nonmetropolitan Bank Loan-To-Deposit Ratios, 1977–80.

Independent Variables	Mean Values of Variables	Coefficients	"t" Values
BS: = 1 for unlimited branching, Arizona 0 for unit banking, Colorado	.366	−.403	3.48***
CS: number of alternative credit sources in the community (other banks, savings and loan associations, industrial banks, credit unions)	3.126	.010	2.85***
TDR: average time to total deposit ratio 1977–80	.631	.556	3.35***
PR: 1980 population/1970 population, community	1.563	−.118	1.15
PR^2	3.312	.018	.83
BS(PR)	.662[a]	.275	2.46***
BS(PR^2)	1.763	−.033	1.55*
PCY: percent change in community per capita income, 1969–77	93.960	.002	1.84**
EP: percent of community population over 65 years old, 1980	13.125	−.009	4.30***
MFG: percent of county labor force in manufacturing, 1980	9.661	−.001	.57
MN: percent of county labor force in mining, 1980	7.598	−.001	1.08
AG: percent of county labor force in agriculture, 1978	3.202	.003	.89
UN: county unemployment rate, 1980	5.596	.008	1.13
Constant	.353		2.21**
N = 238	R^2 = .153		F = 4.292***

*, **, *** Indicate one-tailed significance at the 10%, 5%, 1% levels respectively.
[a] Mean values of PR and PR^2 for Arizona are 1.855 and 5.117, respectively.

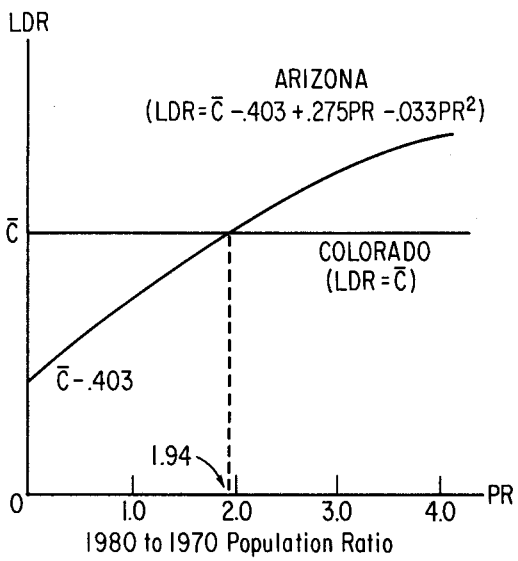

Figure 1. Estimated Bank LDR and Community Population Growth Rate Relationships, Colorado and Arizona.

creased at a decreasing rate as community population growth rates increased. The Arizona LDR-PR relationship is represented graphically in Figure 1 by the quadratic function $LDR = \bar{C} - .403 + .275 (PR) - .033 (PR^2)$.

The two functions intersect when the 1980-1970 population ratio equals 1.94 (an annual population growth rate of 6.9 percent). Banks in nonmetropolitan Arizona communities with an annual population growth rate of less than 6.9 percent had LDRs less than similar Colorado communities. Arizona communities with growth rates above 6.9 percent experienced LDRs greater than the Colorado average. The mean value of the Arizona population variable was 1.86 (an annual rate of 6.4 percent). Thus, the results indicate that Arizona branch offices located in above-average growth rate areas had LDRs

greater than those of Colorado banks. Arizona banks located in slowly growing communities had LDRs less than those reported by Colorado's unit banks. The above findings are consistent with the hypothesis that branch banks reallocate funds from capital surplus to capital shortage regions.[12]

Conclusions and Implications

Comparisons of Arizona and Colorado LDRs provide evidence of three principal differences in branch and unit banking lending behavior. As anticipated, Arizona's branch banks made proportionately more loans than Colorado's unit banks. Branch banks can take more risks in lending because of broader deposit bases, more diversified loan portfolios, and easier access to national money markets. Second, higher LDRs in metropolitan *vs.* nonmetropolitan Arizona indicate that branch banks may have transferred funds from rural to metropolitan branches. However, the LDRs of nonmetropolitan Arizona and Colorado were similar, indicating that the relationship between metro and nonmetro branches cannot be classified as "parasitic." Third, Arizona's branch banking system appeared more responsive to regional differences in the demand for loanable funds than Colorado's unit banks. Faster growing areas received more credit in a multioffice system.

The current trend toward increased multioffice banking will affect the availability of credit in nonmetropolitan communities. However, the net effect of branch banking on the reallocation of loanable funds appears to be primarily intrarural and not rural-to-urban. Therefore, rural communities as a whole will not "gain" or "lose" if branch banking activity is expanded. Rapidly growing nonmetropolitan areas are likely to experience an increase in lending activity, while loan-to-deposit ratios in slower growing cities will be lower. This difference in the allocation of funds is consistent with improved economic efficiency. To the extent that population growth rate differences are a good proxy for loan demand differences, a branch banking system appears more able to adjust to changes in loan demand. However, these funds' flows may be viewed by some as an additional retardant to the growth and development of slower growing regions. Thus, despite the fact that economic evidence favors more extensive branching, the potentially adverse social consequences guarantee the continuation of this debate.

[12] Further evidence of the responsiveness of branch banks to regional differences in loan demand is provided by running separate regressions for the Arizona and Colorado data. For Arizona, LDR = .170 PR − .017 PR^2. Both coefficients were significant at the .01 level and the $\bar{R}^2$ = .384. Neither PR nor PR^2 was significant at the .10 level for the Colorado regression, and the $\bar{R}^2$ was only .046.

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