

# Bank Structure and Mortgage Rates: Implications for Interstate Banking

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Competition in financial markets has been the subject of many studies in the area of market structure and performance. This paper analyzes the differences in mortgage rates between unit banking and branch banking states to consider the likely outcome of interstate banking on competition. A model of interest rate determination is developed which suggests that, at least in

the mortgage market, interstate banking will, *ceteris paribus*, decrease competition if it lowers the number of competing firms and increases deposit concentration levels. Support is provided for the argument that only those states under statewide branching laws may receive more competitive environments from the spread of interstate banking.

Recently there has been considerable interest in the issue of the liberalization of the branching laws that currently constrain the location of commercial banks. The McFadden Act of 1927 allows the states to regulate the branching of both federally and state-chartered banks. The related issue of interstate banking has brought with it much discussion. The issues include concern over the possible failure of existing banks and the introduction of destructive competition brought about by new entry.<sup>1</sup> Much debate still exists over the associated issues of economies of scale in banking as well as the differential effects of *de novo* entry and new branching on competition.<sup>2</sup>

This paper extrapolates from differences in mortgage rates between branching and unit banking states to assess the likely consequences of interstate banking on competition. A reduced-form equation explains differentials in mortgage rates as a function of demand, risk, supply of funds, and market structure variables. The results confirm the basic outcome of competitive behavior. The greater the number of competing firms and the lower the concentration of deposits in a market area, the lower will be interest rates on mortgages, *ceteris paribus*. One policy con-

clusion is that at least in the mortgage market the spread of interstate banking will, *ceteris paribus*, decrease competition if it increases deposit concentration levels and lowers the number of competing firms. One means of lowering mortgage rate differentials is through increased control of branching and the relaxation of entry restrictions of new firms. It is also argued that only those states under statewide branching laws may receive more competitive environments from the introduction of interstate banking.

## PREVIOUS RESEARCH

The relationship between market structure and performance in financial markets has been the subject of many studies. Measures of performance have included profit rates, interest rates charged on loans, interest rates paid on deposits, service charges, and hours of operation. Since the present paper uses interest rates on loans as the measure of performance, this discussion is confined primarily to previous studies that use interest rates to measure performance.

Locational differences in demand for funds affect differentials in interest rates. As proxies for the demand for housing, Aspinwall (1970) and Davis and Verbrugge (1978) use changes in the number of households, while Kaufman (1966) uses changes in population. Differences in borrower risk also account for interest rate differentials. Davis and Verbrugge (1978) find that the ratios of the installment-to- and construction-to-total mortgage loans affect rates positively. Longbrake and Peterson (1979) find that past losses raise interest rates.

<sup>1</sup> For discussion of these issues see Savage and Solomon (1980).

<sup>2</sup> For discussion of economies of scale in banking see Benston (1972), Rhoades (1977) and Heggestad (1979) review the literature on competition in banking.

Differences in market structure also explain interest rate differentials.<sup>3</sup> Aspinwall (1970), Fraser and Rose (1971), and Longbrake and Peterson (1979) find both the number of firms and concentration ratios affecting interest rates in the predicted direction. Edwards (1964), Rhoades (1977), and Longbrake and Peterson (1979) find no significant relationship between interest rates and branching laws. Relatively lower rates of mobility and turnover for the three largest banks in unit banking states is found in Heggestad and Rhoades (1976).

One problem in all these studies, that market structure is defined by only one type of lender, is most serious when more than one type of firm serves the market, as is the case for mortgages. Flechsig (1965) and Kaufman (1966) study the effect of commercial bank structure on business loan rates in various Standard Metropolitan Statistical Areas (SMSAs). Aspinwall (1970) uses a sample of commercial bank mortgage rates in 31 SMSAs. Fraser and Rose (1971) consider average loan rates of commercial banks in 78 "small" cities in Texas. Heggestad and Mingo (1976) use a sample of 236 commercial banks in 52 SMSAs to study differentials in new car loan rates. Davis and Verbrugge (1978) study locational differences in average mortgage loan yields of 795 savings and loan associations. Longbrake and Peterson (1979) use data from 911 commercial banks to study differences in average yields on mortgage portfolios. Rhoades (1979) considers a sample of 184 SMSAs to test the effect of thrift institutions on the average yield on bank loans.

To control for the effect of nonbank lenders on performance, several studies use a dichotomous variable. Heggestad and Mingo (1976) find that the presence of savings and loan associations helps to explain differentials in service charges on demand deposits at commercial banks. Other methods of controlling for competing firms have also been used. Kaufman (1966) found that the ratio of savings and loan association assets to commercial bank deposits affected commercial bank loan rates in one of two years tested. White (1976) found that the combined number of savings and loan associations and commercial banks affected the number of commercial bank offices. Davis and Verbrugge (1978) find a small but significant effect on mortgage rates of savings and loan associations when the deposit concentration ratios and number of firms include mutual savings banks and commercial banks along with savings and loan associations. Rhoades (1979) finds some evi-

dence that nonbank thrifts influence the portfolio decisions of commercial banks.

These studies suggest two avenues for new research. First, one should consider all competing firms in market performance. Studies that do not do so may lead to biased results. In particular, studies that consider only one form of organization may overestimate the impact of market structure and competition on performance in markets with many competing firms. Second, new ways of considering competing firms will provide more information on how "competitive" or substitutable they are in product markets. One obvious way of improving measures of market structure is to substitute quantitative measures of nonbank competition for the dichotomous measures of nonbank presence used in White (1976), Davis and Verbrugge (1978), and Rhoades (1979).

## DATA

Thus a study of differences in performance across areas must include all the major firms. This point is especially relevant because of the growing homogeneity of depository financial institutions brought about by the Depository Institutions Deregulation and Monetary Control Act of 1980. This paper models the mortgage market because it is a distinct market with many competing financial institutions. As such the likely effects of interstate banking may be best observed in the mortgage market.

The data employed in this paper (Federal Home Loan Bank Board, 1979) result from a survey of all qualifying loans in 1975 for single-family, nonfarm, conventional mortgages closed during the first five working days of each month. Respondents include all the major mortgage lenders: commercial banks, mortgage bankers, mutual savings banks, and savings and loan associations. The local market area is approximated by the SMSA. The sample consists of 62,409 loans in 111 SMSAs. The data are calculated as annual averages for all reported loans (i.e., not annual averages of monthly data).<sup>4</sup> The number of loans for these SMSAs range from 63 to 5,295. All loans are for existing dwellings since the commitment lag tends to be shorter for existing than for new dwellings and allows the terms at the closing date to reflect more accurately current mortgage market conditions. The interest rate is an effective rate calculated by the

<sup>3</sup> See Heggestad (1979) for a thorough review of this literature.

<sup>4</sup> This may produce biased estimates if there are significantly more loans in one or more months than the average number. But this problem is probably not serious for cross-sectional data.

FHLBB's amortizing initial fees and charges over a ten-year period.

These data allow several improvements in the study of the relationship between market structure and performance. One is the use of an effective interest rate on conventional mortgage loans only, while most studies use average loan rates as calculated by dividing total interest and fees by total loans per year. As Heggstad (1979) points out, one of the obvious problems of using average loan rates is that interest rates vary with the type, maturity, and risk characteristics of loans, so part of the variation in loan rates may result from differences in the economic circumstances of SMSAs rather than from market structure. The data employed in this paper isolate the conventional mortgage market and include all the major mortgage lenders. Since the effective interest rate in this study is determined by the interactions of all major lenders, it should allow better estimation of the relationship between structure and performance.

A second improvement comes from the measures of risk. All loans are conventional. By contrast, previous studies (Davis and Verbrugge (1978); Longbrake and Peterson, 1979) have included FHA and VA mortgages along with conventional mortgages, yet the risk characteristics of conventional and nonconventional loans may differ. Except for Longbrake and Peterson (1979) the present study is the first to use foreclosure rates.

## AN EMPIRICAL MODEL

The model generally used to test the structure-performance relationship in financial markets is of the form<sup>5</sup>

$$P = f(D, C, M, S, X) \quad (1)$$

where

$D$  = set of variables to measure demand conditions

$C$  = set of variables to measure cost differences across firms and markets

$M$  = measure of deposit concentration

$S$  = other structure variables

$X$  = set of control variables associated with product characteristics

$P$  = some aspect of performance, such as the interest rate on loans.

As Heggstad (1979) argues, no rigorous theoretical model provides the correct specification of the relationship between structure and performance or, consequently, the appropriate functional form of the equation.<sup>6</sup> Equation (1) is a reduced-form equation.<sup>7</sup> Its use here facilitates comparisons of past research with the present paper. Also, a linear, reduced-form equation allows one to measure the net impacts of independent variables regardless of whether the supply or demand equations have shifted.<sup>8</sup>

Demand conditions  $D$  are measured by population and the percentage change between 1974 and 1975. Both should be positively related to mortgage rates. The local quantity of deposits  $C$  is used to measure cost differences across firms and markets. The greater the quantity of deposits, the lower interest rates should be, *certeris paribus*.<sup>9</sup> The combined total deposits of commercial banks, mutual savings banks, and savings and loan associations and the percentage change between 1974 and 1975 control for cost differences.<sup>10</sup>

An additional element of costs is the ratio of the number of commercial bank offices to the numbers of mutual savings banks and savings and loan association offices.<sup>11</sup> If there are differences between firms in the spread between borrowing and lending rates, these differences may affect differentials in local interest rates. For example, differences in regulation concerning the composition of assets and in Regulation  $Q$  may produce differences in returns and the costs of funds to various types of firms. If it is easier for commercial banks to obtain charters than thrifts, then artificial entry barriers may affect interest rate differentials. One may expect that a higher ratio,

<sup>5</sup> Heggstad and Mingo (1976) find the concentration-price relationship to be nonlinear in some product markets such as new car loans and the service charges on demand deposits.

<sup>7</sup> Heggstad (1979) discusses four econometric problems associated with estimating the relationship in this manner.

<sup>8</sup> The regression results shown are from a linear specification of the model. Log linear and semi-log linear specifications were also tested but did not produce better results. Other studies that use linear specifications for the mortgage market are Davis and Verbrugge (1978) and Longbrake and Peterson (1979).

<sup>9</sup> In the case of binding Regulation  $Q$  ceilings, this variable should reflect supplies of funds. Otherwise this variable might reflect the abilities of firms to attract deposits through changing deposit rates.

<sup>10</sup> Data on deposits at commercial banks and mutual savings banks are obtained from *Annual Report of the Federal Deposit Insurance Corporation* (1975). Data on deposits at savings and loan associations are obtained from *Summary of Savings Accounts by Geographic Area* (1974, 1975). All deposits are in millions of dollars.

<sup>11</sup> Numbers of commercial banks and mutual savings banks are obtained from *Summary of Accounts and Deposits* (1974, 1975). Numbers of savings and loan associations are obtained from *Summary of Savings Accounts by Geographic Area* (1974, 1975).

<sup>5</sup> Heggstad (1979) reviews several applications of this form.

*ceteris paribus*, leads to higher mortgage rates because mutual savings banks and savings and loan associations must invest a higher proportion of their assets in conventional mortgages than do commercial banks.

Several control variables relate to the product itself: loan-to-value, term-to-maturity, and foreclosure rate variables.<sup>12</sup> In this study there is a single product of heterogeneous quality: conventional mortgages. The greater the risk characteristics of borrowers, *ceteris paribus*, the higher the interest rates, to compensate lenders for higher probabilities of default or delinquency. The signs on both the loan-to-value and foreclosure variables should be positive, while the sign on the term-to-maturity variable is ambiguous. A longer term leads to lower monthly payments and consequently to a lower probability of default; hence term-to-maturity might take a negative sign. But a longer term implies a slower paydown; hence term-to-maturity might also take a positive sign (reflecting higher risk for longer terms.)<sup>13</sup> Since there is no *a priori* reasoning to choose one explanation over the other, the expected sign is ambiguous.<sup>14</sup>

Market structure variables *M* and *S* define the environment within which firms compete. This paper defines market structure as the environment within which commercial banks, mutual savings banks, and savings and loan associations compete. Mortgage bankers are excluded since there is no data by SMSA on the location, number, or size of mortgage bankers.<sup>15</sup> Numbers of the three types of firms are one measure of market structure. Two quantitative measures of the numbers of institutions are used: the number of firms and the total number of offices (which includes all branches). If the branches of a firm do not compete with each other, the specification of this variable is important. Competition may best be measured as the number of firms not the total number of offices, since branches may represent more of a convenience to customers than as competing firms.

Deposit concentration ratios for commercial banks are also used to measure the effect of market structure on interest rates. Ratios for commercial banks are

used, since a three- or five-firm concentration ratio will generally include only commercial banks because they are typically the largest depository financial institutions in any SMSA.<sup>16</sup>

A dummy variable for unit banking is included to test whether unit banking laws increase competition through lower deposit concentration than do state-wide and limited branching laws.<sup>17</sup>

The measure of performance *P* is the effective interest rate on conventional mortgage loans.

#### *List of Independent Variables*

<i>POP</i>	= population in 1975
<i>P7574</i>	= percentage change in population between 1974 and 1975
<i>DEP</i>	= total deposits at commercial banks, mutual savings banks, and savings and loan associations in 1975
<i>D7574</i>	= percentage change in total deposits between 1974 and 1975
<i>FOR</i>	= foreclosure rate in 1975
<i>LV</i>	= loan-to-value ratio in 1975
<i>TM</i>	= term to maturity in 1975
<i>FIRM</i>	= number of commercial banks, mutual savings banks, and savings and loan associations in 1975
<i>OFFICES</i>	= number of offices of commercial banks, mutual savings banks, and savings and loan associations in 1975 (includes branches)
<i>CO3</i>	= three-firm deposit concentration ratio in 1975
<i>CO5</i>	= five-firm deposit concentration ratio in 1975
<i>UB</i>	= unit banking dummy (UB=1 if unit bank state, UB=0 otherwise)
<i>RCS</i>	= number of commercial bank offices divided by the numbers of mutual savings bank and savings and loan association offices in 1975.

<sup>12</sup> The foreclosure rate is obtained from unpublished FHL BB files and is calculated for Federal Savings and Loan Insurance Corporation-Insured savings and loan associations by SMSA in 1975. Loan-to-value ratios and terms of maturity are obtained from Federal Home Loan Bank Board (1979).

<sup>13</sup> Meador (1981) argues that default risk attaches to market value of house, not to borrower income. In effect, the borrower has a put option.

<sup>14</sup> See Barth, Cordes, and Yezer (1979) for a discussion of this point.

<sup>15</sup> This should not limit the results of the study since mortgage bankers are not net lenders.

<sup>16</sup> Davis and Verbrugge (1979) calculate concentration ratios for all types of institutions and find that these variables do not explain much of the differentials in interest rates. Deposit ratios are from *Summary of Accounts and Deposits* (1974, 1975).

<sup>17</sup> It can be argued that state branching laws for commercial banks represent the state branching environment for all institutions. It is likely that states with liberal commercial bank branching laws would also treat mutual savings banks and savings and loan associations in a similar manner.

**TABLE 1. Regression Results Using Effective Interest Rate as Dependent Variable**

Independent Variable	Equation					
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	8.21 <sup>c</sup> (22.00)	8.16 <sup>c</sup> (21.31)	8.06 <sup>c</sup> (21.45)	7.99 <sup>c</sup> (21.03)	7.85 <sup>c</sup> (18.89)	8.17 <sup>c</sup> (21.87)
POP	0.0001 <sup>a</sup> (1.35)	-0.0004 (-0.66)	-0.0001 (0.38)	-0.0001 (0.49)	0.00008 (0.29)	0.0001 (0.24)
P7574	1.49 (1.16)	1.62 (1.23)	1.67 <sup>a</sup> (1.30)	1.61 (1.26)	1.12 (0.88)	1.36 (1.05)
DEP	-0.00001 (-1.03)	-0.00001 (-0.68)	-0.00001 (-0.74)	-0.00001 (-0.85)	-0.00001 (-0.66)	-0.00001 (-0.69)
D7574	1.68 <sup>c</sup> (3.00)	1.49 <sup>c</sup> (2.64)	1.75 <sup>c</sup> (3.11)	1.79 <sup>c</sup> (3.17)	1.78 <sup>c</sup> (3.23)	1.94 <sup>c</sup> (3.25)
FOR	0.45 <sup>a</sup> (1.40)	0.37 (1.14)	0.38 (1.20)	0.42 <sup>a</sup> (1.33)	0.47 <sup>a</sup> (1.49)	0.48 <sup>a</sup> (1.47)
LV	0.01 <sup>b</sup> (2.06)	0.01 <sup>b</sup> (2.00)	0.01 <sup>b</sup> (2.07)	0.01 <sup>b</sup> (2.12)	0.02 <sup>c</sup> (2.76)	0.01 <sup>a</sup> (1.48)
TM	-0.006 (-0.56)	-0.004 (-0.37)	-0.008 (-0.76)	-0.0008 (-0.77)	-0.0006 (-0.58)	0.0004 (0.04)
FIRM	-0.0009 <sup>b</sup> (-2.17)					
OFFICES		0.0002 (0.79)				
CO3			0.003 <sup>c</sup> (2.38)			
CO5				0.003 <sup>c</sup> (2.44)		
UB					-0.17 <sup>c</sup> (2.92)	
RCS						0.03 <sup>b</sup> (2.07)
R <sup>2</sup>	0.2827	0.2543	0.2892	0.2911	0.3076	0.2798

<sup>a</sup> Significance at 90 percent level.

<sup>b</sup> Significance at 95 percent level.

<sup>c</sup> Significance at 99 percent level.

## RESULTS

The six cross-sectional regressions appear in Table 1.<sup>18</sup> Including each structure variable in a separate regression avoids the problem of multicollinearity. For example, the branching variable *UB* is clearly related to the concentration and number of institutions variables. Savage and Solomon (1980) find that states with unit banking laws have lower deposit concentration ratios than do states that allow some form of branching. The population variables *POP* and *P7574* are generally insignificant. Where significant, their positive sign suggests that they exert upward pressure on interest rates.<sup>19</sup>

The coefficient on the total deposit variable *DEP* is always negative but never significantly different from zero. The percentage change in deposits variable *D7574* is uniformly positive and significant.<sup>20</sup> This suggests that, with all else remaining the same, the greater the percentage change in deposits in an area, the higher interest rates tend to be. While this result is unexpected, it may indicate that this variable is a proxy for growth of the effective demand for housing.

The borrower risk variables *FOR* and *LV* both exert positive impacts on interest rates and are generally significant. The signs on the term-to-maturity variable are generally negative and are never significant. By contrast, Longbrake and Peterson

<sup>18</sup> The use of deposits and population separately is equivalent to using their ratios, except that the respective coefficients are unconstrained.

<sup>19</sup> Similar results for these variables are found in Kaufman (1966) and Longbrake and Peterson (1979).

<sup>20</sup> The percentage change between 1973 and 1975 for both population and deposits were also used. These variables were never significant, implying that markets react rather quickly.

(1979) found no significant relationship between foreclosure rates and interest rates.

The number of firms *FIRM* has a negative and significant impact on interest rates, implying that an increase of ten firms would reduce interest rates by nine basis points. The total number of offices *OFFICES*, by contrast, does not exert a significant impact on interest rates. These results confirm the notion that areas with many firms, *ceteris paribus*, have lower interest rates, while the number of offices is not a significant determinant. Hence increased branching does not reduce interest rates.

The three- and five-firm concentration ratios *CO3* and *CO5*, respectively, exerted positive and significant impacts on interest rates. It is interesting to compare the sizes of coefficients on the concentration variables with those found in other studies. Edwards (1972) compares the work of three studies that find concentration variables to be significant and virtually the same at 0.006. The magnitude of the concentration variable in this study is 0.003 (suggesting that a 10 percent increase in concentration will increase loan rates by three basis points). The reason for the size difference may be because the other studies consider only commercial banks, overestimating the effects of concentration on loan rates in markets with several types of competing firms. Studies using average loan rates may attribute rate differences due to the non-uniform and multiproduct compositions of loan portfolios to concentration.

The coefficient on the unit banking variable *UB* is negative and significantly different from zero, suggesting that states with limited and statewide branching laws offer higher interest rates, *ceteris paribus*, than do states with unit banking laws. This result also supports the finding above that areas with a relatively large number of firms *FIRM* offer relatively low interest rates. This connection between the effects of *UB* and *FIRM* variables results because unit banking states have more firms than do states with limited or statewide branching laws.

The ratio of commercial bank offices to mutual savings banks and savings and loan association offices *RCS* has a positive and significant impact on interest rates. The size of the coefficient indicates, for example, that a 10 percent increase in this ratio would increase interest rates by 30 basis points, suggesting that differences produced by differing local proportions of the various types of firms affect mortgage rate differentials. This is expected since the higher the number of commercial banks relative to the numbers of mutual savings banks and savings and loan associations, the weaker is the relative commitment of the firms to the mortgage market. This variable serves

as a proxy for defining differences in the characteristics of the firms competing in this market and reinforces the notion that the modeling of all types of firms in the market is essential to an understanding of differentials in interest rates.

The coefficients of determination  $R^2$ 's range from 0.2543 to 0.3076, compared with approximately 0.15 for this type of study, as discussed in Heggstad (1979). This improvement results from the use of an effective interest rate for a well-defined product market. Most of the previous studies did not control for nonbank thrifts, risk measures for a well-defined market, and differences produced by varying the proportions of banks and nonbank thrifts.

## CONCLUSION

The tests in this paper suggest that greater competition among firms in an area lowers mortgage interest rates. The measures of competition that helped explain interest rate differentials are the number of firms, deposit concentration ratios, and branching laws. The ratio of commercial banks to mutual savings banks and savings and loan associations had a significant and positive effect on interest rates. States with unit banking laws have lower interest rates than states that allow branching. Since states with unit banking laws have more firms and lower concentration ratios than do states with limited and statewide branching, it seems reasonable to point to branching laws as the key to determining the relative degree of competition in an area. One policy implication of this result is that one means of reducing mortgage rates is increased control of branching and the relaxation of entry restrictions of new firms. One limitation of this study is the extent to which one may make policy conclusions for all financial markets. An implication of this study is that there is no national market for mortgages. While this allows one to extend policy suggestions for households and small firms, national markets may exist for relatively large firms. For example, large firms may already borrow on the national market and not be subject to the policy conclusions drawn from this study. It is important to recognize differences in product markets when studying the probable effects of change in regulation.

This study also has implications for some recent developments in the financial sector. The increase in bank mergers, bank and nonbank acquisitions by bank-holding companies, and the activities of foreign banks in the United States have altered the structure of the banking industry.<sup>21</sup> In one sense these develop-

<sup>21</sup> For a discussion of these issues see Rhoades (1980).

ments are a liberalization of the restrictions on interstate banking in the McFadden Act, but the potential effects on market concentration, numbers of firms and branches, and market shares of different types of firms of mergers, bank-holding companies, and foreign banking need to be analyzed. For example, this study suggests that the relative proportions of different types of firms in a market will affect the local mortgage rate. Research on the degree of substitutability between the traditional forms of firms and holding companies is needed to define the appropriate market. Once the market is defined, research similar to the present study may provide insights about the competitive effects of interstate banking on competition.

This study suggests that an increase in interstate banking will produce increased concentration and decrease competition among financial intermediaries. Savage and Solomon (1980) expect that interstate banking will increase the number of commercial banks and decrease deposit concentration ratios in states with statewide branching laws. In other states, they expect interstate banking to decrease the number of commercial banks and increase concentration ratios. The present paper suggests an interesting policy implication, given that these predictions are accurate. If relaxation of the McFadden Act promotes *de novo* entry, then states that previously allowed statewide branching may witness an increase in competition. On the other hand, states previously under unit banking laws would have less competition owing to a decline in the number of firms. This study suggests that the new branches in formerly unit banking states will not increase competition in them. One major concern is that while all local markets may be made more competitive through the reduction of restrictions on *de novo* entry, it may be that only those states formerly under statewide branching laws will receive more competitive environments from the introduction of interstate banking. Obviously more research on the expected outcome *de novo* entry and branching from the relaxation of the McFadden Act is necessary to assess the desirability of interstate banking.

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