

Do Multibank Holding Companies Affect Banking Market Concentration?

By Charles S. Morris and Katherine M. Hecht

With the recent surge in interstate bank mergers, the competitive effects of interstate banking have become an issue of increasing importance to policymakers. Some people argue that interstate banking will reduce the competitiveness of banking markets by increasing banking market concentration. At a theoretical level, however, it is not at all clear that an increase in concentration would reduce the competitiveness of banking markets. Banks could behave competitively even in highly concentrated markets, especially if entry into those markets was unrestricted.

But what if interstate banking was not expected to raise banking market concentration in the first place? Then, regardless of which theory was correct about the relationship between concentration and competition, interstate banking would not be expected to result in less competitive banking markets. Because interstate banking is most likely to

occur through bank holding companies acquiring banks in more than one state, one way to infer the likely effect of interstate banking on local banking market concentration is to see what effect intrastate expansion of multibank holding companies has had on local market concentration.

Using data from local banking markets in states of the Tenth Federal Reserve District and controlling for other factors that affect banking market concentration, this article finds no relationship between multibank holding company presence and local banking market concentration. Thus, to the extent that local banking markets in Tenth District states are similar to other banking markets and interstate holding company expansion is similar to intrastate expansion, interstate banking in the form of interstate bank holding company acquisitions would not be expected to increase local banking market concentration.

The first section of the article presents background information on multibank holding companies in Tenth District states and on the concentration of local banking markets in

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these states between 1973 and 1983. The second section discusses the effect of multibank holding companies on banking market concentration within the context of a simple competitive model of the determinants of market structure. The third section uses a single regression equation to obtain estimates of the effect of multibank holding companies on concentration.

Multibank holding companies and market concentration: overview

Local banking markets in Tenth District states exhibit significant differences in both the presence of multibank holding companies (MBHC's) and the degree of concentration. Because of these differences, Tenth District banking markets can provide useful information about the effect of MBHC's on concentration. This section provides an overview of MBHC's in district states using a sample of 406 local banking markets that had two or more banking organizations over the period from 1973 to 1983. It then presents an overview of the concentration of these markets.¹

Multibank holding companies

State laws governing the formation of MBHC's differed across the seven states of the district over the 1973-83 period. MBHC's were allowed in Colorado, Missouri, New Mexico, and Wyoming, while they were not

allowed in Kansas, Nebraska, and Oklahoma. Colorado, New Mexico, and Wyoming had no restrictions on the formation or expansion of bank holding companies. Missouri had no restrictions on bank holding company acquisitions until 1975, when acquisitions were allowed only if the acquiring company's share of state banking deposits after the acquisition was less than 13 percent. Nebraska prohibited MBHC's entirely until March 31, 1983, when banks and bank holding companies were allowed to acquire financial institutions that were failing. MBHC's were prohibited in Kansas and Oklahoma throughout the sample period.²

In the four states that allowed MBHC's, there was a dramatic increase in the presence of MBHC's between 1973 and 1983 (Table 1). There were 34 MBHC's in district states in 1973. Of these, 32 had more than one bank in at least one market. By 1983, the number of MBHC's had increased to 80, with 58 owning more than one bank in at least one market. The number of MBHC-affiliated banks increased from 213 in 1973 to 566 in 1983, while the percentage of banks affiliated with MBHC's in markets where MBHC's were allowed more than doubled—increasing from 19 percent in 1973 to 40 percent in 1983. The percent of commercial bank deposits at MBHC-affiliated banks also rose sharply, from 46 percent in 1973 to 61 percent in 1983.

The presence of MBHC's varied significantly among the markets where they were allowed. In 1983, for example, there were no MBHC-affiliated banks in 25 percent of the markets where they were allowed. MBHC-

¹ The construction of the data set and the reasons for only using the 406 markets that had two or more banking organizations over the sample period are discussed in the Appendix. For reasons to be discussed below, local banking markets are defined as Metropolitan Statistical Areas (MSA's) or non-MSA counties. For a more complete discussion of banking market concentration in Tenth District states, see Charles S. Morris, "Banking Market Structure in Tenth District States, 1973-83," *Economic Review*, Federal Reserve Bank of Kansas City, July/August 1985, pp. 18-31.

² MBHC's are currently allowed in all Tenth District states. MBHC's have been allowed in Kansas since July 1985, in Nebraska since September 1983, and in Oklahoma since October 1983.

TABLE 1
Multibank holding companies
in Tenth District states

	<u>1973</u>	<u>1983</u>	<u>Percent Change</u>
Number of MBHC's	34	80	135.3
Number of MBHC's owning more than one bank in a market	32	58	81.3
Number of banks affiliated with MBHC's	213	566	165.7
Percent of commercial banks affiliated with MBHC's	19	40	—
Percent of commercial bank deposits at banks affiliated with MBHC's	46	61	—

affiliated banks accounted for less than a third of the deposits in 22 percent of the markets, between a third and two-thirds of the deposits in 32 percent of the markets, and more than two-thirds of the deposits in 21 percent of the markets.

Banking market concentration

To present an overview of market concentration, a measure of concentration must be chosen. The concentration of a market is the extent to which most of the market's output is produced by only a few firms. Thus, the concentration of a market will be greater the fewer the firms or the more unequal their size. A commonly used measure of concentration that captures both of these effects is the Herfindahl Index.

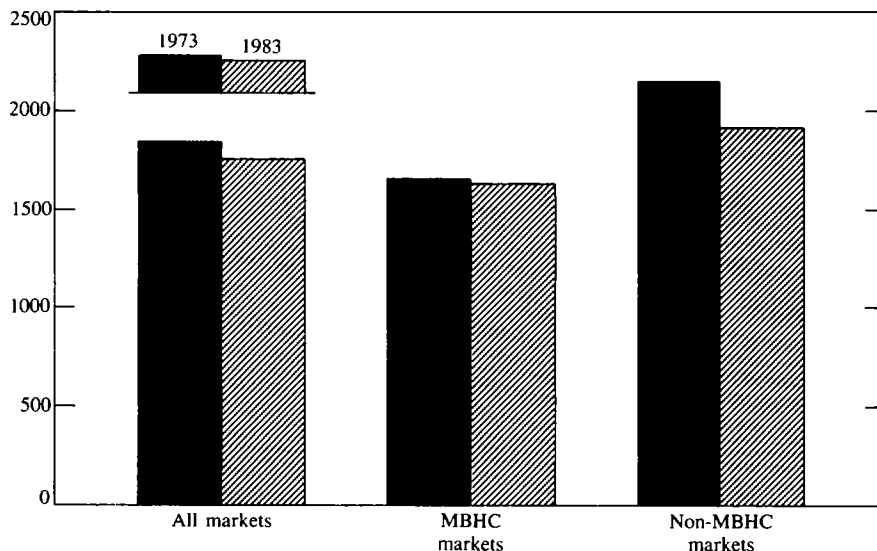
The Herfindahl Index is defined as the sum of the squared market shares of industry output of every firm in the market. For example, in a four-firm industry where the firms have market shares of 40, 30, 20, and 10 percent, the Herfindahl Index would be $40^2 + 30^2 + 20^2 + 10^2 = 3,000$. When the number of firms in a market increases or the size distri-

bution of firms becomes more equal, market concentration measured by the Herfindahl Index will fall. The most concentrated market would be a single-firm market, and it would have a Herfindahl Index of 100^2 , or 10,000. If the number of firms increased to n with all firms remaining the same size, the Herfindahl Index would decrease to $10,000/n$. Finally, if the n firms were not all the same size, the Herfindahl Index would still fall below 10,000, but it would be greater than $10,000/n$.

Commercial bank output, the commercial banking firm, and the banking market must be defined before the Herfindahl Index can be calculated. Total deposits are used to measure bank output because deposit data are available by individual office. The definition of the banking firm used here is the bank holding company or the unaffiliated bank.³ Because most consumers of banking services purchase banking services from local institutions, local geographic areas are used to define the bank-

³ Although savings and loan associations have become a major alternative supplier of many banking services, they are not included in this study because data were not available for some of the variables used later in the analysis.

CHART 1
Aggregate Herfindahl Index



ing market. The local market areas used to measure the banking market are Metropolitan Statistical Areas (MSA's) or non-MSA counties.⁴ Therefore, the banking firm's market share is calculated as the bank holding company's or unaffiliated bank's share of MSA or non-MSA county total deposits.⁵

Chart 1 shows aggregate Herfindahl Indexes for 1973 and 1983 for 406 local markets in Tenth District states. The indexes also are shown for the subset of markets where

MBHC's were allowed (MBHC markets) and the subset of markets where MBHC's were not allowed (non-MBHC markets).⁶ The aggregate Herfindahl Indexes are weighted averages of the local market indexes, where the weights are the local market's share of group deposits. The aggregate Herfindahl Index for all markets was 1,883 in 1973 and 1,788 in 1983. MBHC markets were less concentrated than non-MBHC markets in both years. The MBHC Herfindahl Index was 1,680 in 1973, which was 494 points less than the non-MBHC Herfindahl Index of 2,174. In 1983 the MBHC index was 1,667, which was 274 points less than the non-MBHC index of 1,941.

⁴ As of June 30, 1983, Standard Metropolitan Statistical Areas (SMSA's) were reclassified as either MSA's or Consolidated Metropolitan Statistical Areas (CMSA's). CMSA's were divided into two or more Primary Metropolitan Statistical Areas. For purposes of calculating measures of local banking market concentration, the MSA category includes SMSA's before June 30, 1983, and SMSA's that were reclassified as CMSA's after June 29, 1983.

⁵ For a more complete discussion of these issues, see Morris, "Banking Market Structure."

⁶ Metropolitan Statistical Areas that crossed state lines were included with the MBHC markets if 50 percent or more of the MSA's deposits were in banks in a state where MBHC's were allowed. Otherwise, they were included with the non-MBHC markets.

Although MBHC markets were less concentrated than non-MBHC markets, it does not follow that MBHC's cause banking market concentration to decline. Because the MBHC classification of a market is only one of the many factors that affect the concentration of banking markets, MBHC markets may be less concentrated than non-MBHC markets for some other reason. In other words, the difference in concentration between MBHC and non-MBHC markets is consistent with MBHC's causing banking market concentration to increase, decrease, or remain the same. Therefore, to isolate the effect of MBHC's on concentration and determine its direction, the MBHC effect must be examined within the context of a general theory of the determinants of market structure.

The effect of MBHC's on market concentration: theory

A competitive model of the determinants of banking market structure is used here to analyze the effect of MBHC's on concentration.⁷ In the simplest of the competitive models, competition among banks and the ability of banks to enter or leave a market ensure that the long-run equilibrium level of concentration will be that which satisfies market demand at the lowest possible cost.⁸ Within the context

⁷ For a discussion of why a competitive model can be used to model banking markets, see Charles S. Morris, "The Competitive Effects of Interstate Banking," *Economic Review*, Federal Reserve Bank of Kansas City, November 1984, pp. 3-16.

⁸ A more detailed analysis of how firm cost conditions and market demand affect market structure can be found in most beginning economics textbooks. For example, see Armen A. Alchian and William R. Allen, *Exchange and Production: Competition, Coordination, and Control*, Wadsworth, Belmont, Calif., 1977. For an analysis that does not rely on the traditional assumptions of perfect competition, see William J. Baumol, John C. Panzar, and Robert D. Willig, *Contestable Markets and the Theory of Industry Structure*, Harcourt Brace Jovanovich, Inc., New York, 1982.

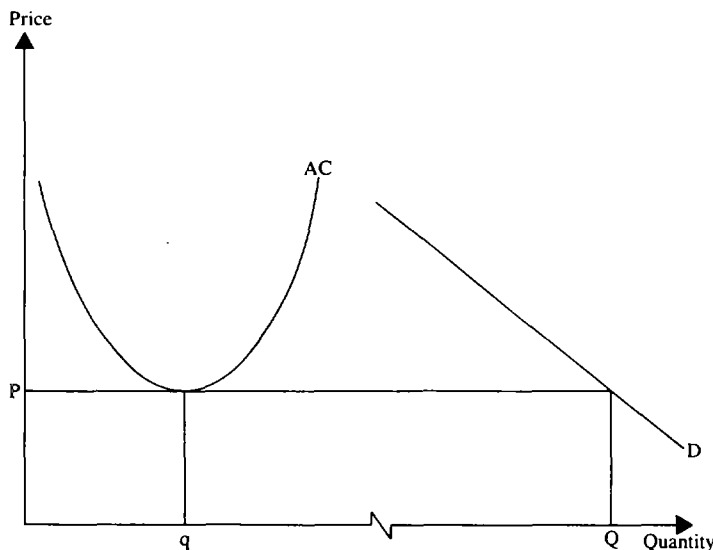
of this model, the effect of MBHC's on the long-run equilibrium level of concentration depends on how MBHC's affect bank cost conditions.

A bank's cost conditions can be summarized by its average cost of producing banking services. The average cost of producing a given level of output is defined as the total cost of producing that level of output divided by the amount of output. Figure 1 shows a typical average cost curve as the curve AC. As output rises, average costs first decline and then rise. One reason for the decline is that some of the bank's costs, such as overhead costs, are fixed. Because these costs do not vary with output, their average level declines as output rises. Also, as output rises from relatively low levels, increased specialization within the bank allows output to rise faster than total costs. At some point, however, the bank's average costs of production stop declining and begin to rise. The reason is that it becomes increasingly difficult for the bank's managers to obtain the information required to make decisions and to coordinate the bank's various activities.

The long-run equilibrium level of market concentration is the one that allows banks to meet market demand in the least costly way. In Figure 1, market demand is represented by the curve D. If all banks have the average cost curve shown in Figure 1, then in the long run the equilibrium market price will be P and the equilibrium market output will be Q. The cheapest way to meet market demand is for every bank to operate at the lowest point on its average cost curve and produce q units of output. Thus, in equilibrium all the banks will be the same size and the number of banks, n, will equal the total size of the market divided by the size of each bank, Q/q.⁹ Because all the

⁹ For simplicity of exposition, it is assumed that Q is an integer

FIGURE 1
Banking market cost and demand conditions



banks are the same size in this example, the equilibrium level of concentration as measured by the Herfindahl Index is $10,000/n$, or $10,000q/Q$. For instance, if market output was 200 and the bank's minimum average cost size was ten, then the equilibrium number of banks would be 20 and the equilibrium level of concentration would be a Herfindahl Index of 500.

The example above demonstrates that the long-run equilibrium level of market concentration depends on the minimum average cost size of banks, q . As was discussed in the previous section, the concentration of a banking market varies inversely with the number of banks. For a given level of market demand, it takes fewer banks to meet that demand when the minimum average cost size of banks is

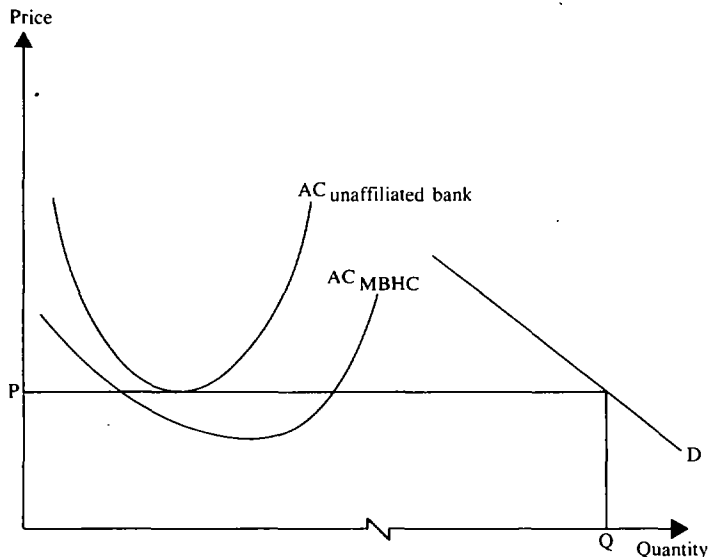
large than when the minimum average cost size is small. Thus, an increase in the minimum average cost size of banks causes the number of banks to fall and the level of concentration to rise. Conversely, a decrease in the minimum average cost size of banks causes the number of banks to rise and the level of concentration to fall.

The effect of MBHC's on the long-run equilibrium level of concentration depends on how affiliation with a MBHC affects a bank's minimum average cost size. Affiliation with a MBHC could cause the minimum average cost size of a bank to increase, decrease, or remain the same. As a result, the theoretical effect of MBHC's on concentration is ambiguous.

A situation where MBHC markets would be more concentrated than non-MBHC markets is illustrated in Figure 2. In this figure, the minimum average cost size of a MBHC-affiliated bank or a group of affiliated banks in the same

multiple of the level of output at which the firm's average cost curve reaches a minimum, q .

FIGURE 2
Banking market cost and demand conditions:
unaffiliated bank versus MBHC



market (multibank organization) is larger than that of an unaffiliated bank.¹⁰ This could be the case if MBHC managers were better at coordinating large-scale bank production than unaffiliated bank managers in the sense that they could operate a large single bank or group of affiliated banks at a lower cost than unaffiliated bank managers.¹¹

¹⁰ Because the banking firm is defined as the banking organization, the average cost curve of a group of affiliated banks is the relevant curve when a MBHC has more than one bank in the same market. If a MBHC has only one bank in a market or a bank is not affiliated with a MBHC, the relevant average cost curve is the individual bank's average cost curve. In Figure 2, the AC_{MBHC} curve is also lower than the unaffiliated bank's average cost curve because banks would not affiliate with a MBHC unless there was a cost advantage in doing so.

¹¹ In the short run, the multibank organization or MBHC-affiliated bank would produce to the right of the minimum of its average cost curve where marginal cost equals price, P , and thereby earn rents on the talent of its management team. In the long run, the price of managerial services would be bid up until AC_{MBHC} was at the same level as and to the right of the unaffiliated bank's average cost curve.

But instead of being more concentrated than non-MBHC markets, MBHC markets could be less concentrated or just as concentrated. The minimum average cost size of a multibank organization or MBHC-affiliated bank could be smaller than that of an unaffiliated bank, causing MBHC markets to be less concentrated than non-MBHC markets. For example, MBHC-affiliated banks might be able to share fixed costs, such as advertising costs, with their affiliates in other markets. Because a MBHC-affiliated bank would have fewer fixed costs to spread over output, the costs of coordinating production would cause its average cost curve to turn upward at a lower level of output than that of an unaffiliated bank. Finally, a multibank organization or MBHC-affiliated bank could have the same minimum average cost size as an unaffiliated bank, in which case MBHC's would have no effect on the level of concentration.

A simple model of the determinants of market structure has been used here to discuss the effect of MBHC's on concentration. In more complicated models, MBHC's could affect concentration in other ways. For example, MBHC markets could be more concentrated than non-MBHC markets if the management of banks affiliated with a MBHC behaved more aggressively than the management of banks that were not affiliated with a MBHC. However, if the more aggressive behavior of banks affiliated with MBHC's caused an increase in the aggressiveness of all banks in a market, MBHC markets could be less concentrated than non-MBHC markets. So even in a more complicated model, the effect of MBHC's on banking market concentration is theoretically ambiguous—MBHC's could cause banking market concentration to increase, decrease, or remain the same. Therefore, empirical evidence must be examined to determine the effect of MBHC's on market concentration.

The effect of MBHC's on market concentration: evidence

To isolate the effect of MBHC's on market concentration empirically, other factors that affect market concentration must be taken into account. A single regression equation that controls for these other factors is used to estimate the effect of MBHC's on concentration.¹² The estimated equation is then used to explain why MBHC markets are less concentrated than non-MBHC markets.

¹² A fixed effects model was used to estimate the equation. The model was also estimated by simply pooling the data and by using a variance components model, both of which also included dummy variables for markets in limited branching states, for MBHC markets, and for MSA markets. These dummy variables are not identified in the fixed effects model because each market has its own constant term. Specification tests were then used to choose the appropriate model.

The empirical equation

The empirical equation used to explain market concentration is summarized in Table 2. The Herfindahl Index is used on the left-hand side of the equation to measure concentration. The first variable on the right-hand side of the equation is a constant term. Each market is allowed to have its own constant term to account for the unique characteristics of a market that remain constant over time.¹³ The second variable, the percentage of market deposits at banks affiliated with a MBHC, is the variable used to determine the effect of MBHC's on market concentration. The other variables on the right-hand side of the equation are included to account for the other factors that affect market concentration.

Some of the variables on the right-hand side of the equation represent factors that affect the long-run equilibrium level of concentration. Market population is included to represent the level of market demand. Increases in market population should cause concentration to decrease. A time trend is included to account for the effect of technological advances, such as improvements in communication and transportation technologies, on the minimum average cost size of a bank. To the extent that these advances have enabled banks to operate at a larger size, concentration should tend to rise over time.

Because market demand and cost conditions are always changing, the empirical equation also includes variables to account for changes in the observed level of concentration during

¹³ A separate constant term can be estimated for each market only because data are available for several markets over time. One advantage of accounting for the uniqueness of individual markets is that MSA's that cross state lines, which are excluded from most studies, can be included here. One disadvantage is that the influence on concentration of market characteristics that are common to a subset of markets but do not change over time cannot be identified.

TABLE 2
The empirical equation

$$HI_{it} = a_i + b_1 MBHCDEP_{it} + b_2 POP_{it} + b_3 T + b_4 TROE70_i + b_5 PCRDEP_{it} + b_6 THI70_i + e_{it}$$

Definitions:

HI_{it} = the Herfindahl Index in market i at time t

a_i = the constant term for market i

$MBHCDEP_{it}$ = percentage of market deposits at banks affiliated with MBHC's in market i at time t

POP_{it} = population (thousands) in market i at time t

T = linear time trend that begins in 1973

$TROE70_i$ = time trend times the return on equity in 1970 in market i

$PCRDEP_{it}$ = the percentage change in market real deposits (1972 dollars) in market i at time t

$THI70_i$ = time trend times the Herfindahl Index in 1970 in market i

e_{it} = zero mean, finite variance error term

the transition of a market from one long-run equilibrium to another. One of those factors is the attractiveness of the market to potential entrants. For example, markets where there are excess profits or where relatively large increases in demand are expected would be more attractive to potential entrants and should, therefore, experience greater decreases in concentration. In the empirical equation, market profits are represented by the product of a time trend and the market's return on equity in 1970, while expected increases in demand are represented by the percentage change in the market's real deposits.¹⁴ The final variable is the product of a time trend and the Herfindahl Index in 1970. This variable is included because the Herfindahl Index

is likely to decline faster in growing markets where concentration is initially high than in growing markets where concentration is initially low.¹⁵

The estimated coefficients of the empirical equation are reported in Table 3. The estimated equation fits fairly well, and all of the coefficients have the expected sign. The standard error of the regression is 220, which is small compared with the unweighted average Herfindahl Index of 3,337. Except for the coefficients on the MBHC and percentage change in real deposits variables, all the coefficients are statistically significant at the 0.01 percent level.

The regression results suggest that MBHC's have no effect on banking market concentra-

¹⁴ Because some theories also suggest that concentration may affect profits, the effect of profits on concentration is specified as the product of market return on equity in 1970 times a time trend to avoid the possibility of simultaneous equations bias. There are some drawbacks to this specification, however. One drawback is that a linear adjustment mechanism is assumed rather than the more common partial adjustment mechanism. Another is that the specification does not account for differences in excess returns after 1970. These drawbacks, however, should not bias the results.

¹⁵ This is most easily seen by looking at a market where the number of firms changes from n equal-sized firms to $n + 1$ equal-sized firms. Because the Herfindahl Index equals $10,000$ divided by the number of firms when all the firms in a market are the same size, the Herfindahl Index is a convex function of the number of firms. Therefore, the Herfindahl Index will decline faster in markets where the initial Herfindahl Index is relatively high. The initial index is the Herfindahl Index in 1970 and not the Herfindahl Index in 1973 because lagged dependent variables cannot be used on the right-hand side in a fixed effects model.

TABLE 3
The estimated coefficients*

Coefficients on:					
<u>MBHCDEP</u>	<u>POP</u>	<u>T</u>	<u>TROE70</u>	<u>PCRDEP</u>	<u>THI70</u>
-0.001 (0.002)	-1.793† (5.860)	55.392† (12.354)	-1.387† (4.282)	-0.490 (0.887)	-0.016† (24.541)

Standard Error: 220

*Absolute value of t-statistics are in parentheses.

†Marginal significance level is less than or equal to 0.01 percent.

Note: The equation was estimated using annual data from 406 local banking markets over the period from 1973 to 1983. The simple average of the constant terms for the MBHC markets is 3,885 and for the non-MBHC markets it is 3,254. In markets where MBHCDEP was positive, the simple average of the constant terms was 3,590. In the remaining markets, the simple average of the constant terms was 3,513.

tion. Although the coefficient on the percentage of market deposits at banks affiliated with MBHC's is negative, the coefficient is small and insignificantly different from zero. Moreover, in markets that have MBHC-affiliated banks (markets where MBHC's are not only allowed but present) the average constant term over all years is 3,590, which is only slightly greater than the average constant term of 3,513 in markets that do not have MBHC-affiliated banks. Thus, these results suggest that the difference in concentration between MBHC and non-MBHC markets must be due to something other than the presence or absence of MBHC's.¹⁶

Why are MBHC markets less concentrated than non-MBHC markets?

It was shown in Chart 1 that, on average, markets where MBHC's were allowed were less concentrated than markets where MBHC's

were not allowed. Table 4 shows that this difference was due largely to a greater demand for banking services in MBHC markets.

In Table 4, the difference between the MBHC market and non-MBHC market Herfindahl Indexes is predicted for 1973 and 1983. The predictions are based on the estimated coefficients from the regression equation and the difference between each explanatory variable in the two types of markets. The first row shows the difference between the actual weighted average Herfindahl Indexes for the two types of markets in 1973 and 1983, while the second row shows the difference between the predicted weighted average Herfindahl Indexes. The remaining rows show the contribution of the explanatory variables to the predicted difference. For each variable, this contribution was calculated by multiplying the difference between the weighted average value of the variable in each type of market by the

¹⁶ It is interesting to note that in the MBHC markets (markets where MBHC's are allowed) the average constant term is 3,885, which is much greater than the average constant term of 3,254 in the non-MBHC markets. This difference in average constant

terms must be due to factors unique to each type of market other than the presence or absence of banks affiliated with MBHC's because the average constant term is about the same in markets with MBHC-affiliated banks as in markets without MBHC-affiliated banks.

TABLE 4
Predicted difference in concentration
between non-MBHC markets and MBHC markets
(non-MBHC markets minus MBHC markets)

<u>Difference in:</u>	<u>1973</u>	<u>1983</u>
(1) Actual Herfindahl Index	494	274
(2) Predicted Herfindahl Index	449	292
<u>Contribution of:</u>		
(3) Constant terms	- 1,042	- 996
(4) Population	1,502*	1,339†
(5) MBHC's	0	0
(6) All other variables	-10	-52

*The weighted average population was 268,000 in non-MBHC markets and 1,106,000 in MBHC markets.
†The weighted average population was 328,000 in non-MBHC markets and 1,075,000 in MBHC markets.

estimated coefficient on the variable.

In 1973 and 1983, markets where MBHC's were allowed were less concentrated, on average, than markets where MBHC's were not allowed largely because the demand for banking services was greater in MBHC markets than in non-MBHC markets. As the second row of Table 4 shows, the predicted weighted average Herfindahl Index for the MBHC markets was less than the predicted value for the non-MBHC markets by 449 points in 1973 and by 292 points in 1983. The third row shows that if all factors other than the factors that are unique to each market were the same in MBHC and non-MBHC markets, MBHC markets would have been more concentrated, on average, than non-MBHC markets by 1,042 points in 1973 and 996 points in 1983.¹⁷ However, the fourth row shows that the effect of the unique factors on concentration is com-

pletely offset by the population variable. Thus, to the extent that the estimated equation accurately accounts for the factors that affect banking market concentration, MBHC markets are less concentrated than non-MBHC markets because the demand for banking services is much larger in MBHC markets than in non-MBHC markets.

Conclusion

Because interstate banking is most likely to occur through bank holding companies acquiring banks in more than one state, one way to infer the likely effect of interstate banking on banking market concentration is to see what effect MBHC's have on concentration. This article finds that MBHC's have no effect on local banking market concentration in states of the Tenth Federal Reserve District. Although markets where MBHC's are allowed were found to be less concentrated than markets where they are not allowed, the results suggest that this difference has not been due to the

¹⁷ These differences are not due, however, to the presence of MBHC's because the average constant term in markets with MBHC-affiliated banks is approximately equal to the average constant term in markets without MBHC-affiliated banks.

MBHC classification of a market. Instead, MBHC markets appear to be less concentrated than non-MBHC markets because the demand for banking services is greater in MBHC markets than in non-MBHC markets. To the extent that local banking markets in Tenth

District states are similar to other banking markets, the results of this study suggest that even if concentrated markets are less competitive than unconcentrated markets, banking policymakers should be less concerned about the competitive effects of interstate banking.

Appendix

Data sources: The bank data are from two sources. The bank office deposit data are as of June 30 of each year and are from the Federal Deposit Insurance Corporation (FDIC) Summary of Deposits report. The net income and equity data are from the Combined Call and Income report. The population data are as of April 1984 and are from the Regional Economic Measurement System Division of the Bureau of Economic Analysis. The series was updated for 1981 through 1983 from the U.S. Department of Commerce, Bureau of the Census, Series P-26.

Data sample: The data consist of 406 MSA's and non-MSA counties located in states of the Tenth Federal Reserve District that had two or more banking organizations over the period from 1973 to 1983. Markets that did not exist over the entire sample period were excluded from the sample because a constant panel was needed to estimate the empirical equation. Markets that did not exist over the entire sample period were non-MSA counties that either became part of an existing MSA, were dropped from an existing MSA, or had no banks for a period of time. The only complication was that Jasper and Newton counties in Missouri became the Joplin MSA in 1981, so that one of the counties had to be excluded from the sample between 1973 and 1980. Because the economic activity was so much greater in Jasper county than in Newton county, Newton county was excluded from the sample over the period of time before 1981.

Markets that had only one bank, and therefore a Herfindahl Index of 10,000, between 1973 and

1983 were also dropped from the sample. This was done for two reasons. First, the sample distribution of the dependent variable in the empirical equation, the Herfindahl Index, had a spike at a value of 10,000, which violates the normality assumption of least squares. Second, the empirical equation breaks down when the Herfindahl Index is 10,000. For example, if a variable, say, x , has an estimated coefficient of 200, then a one unit increase in x should cause the Herfindahl Index to rise by 200 points. But if the Herfindahl Index is already at its maximum value of 10,000, it cannot increase at all.

Data adjustments: (1) Market variables were calculated using only FDIC insured banks that had deposits and that existed during the entire calendar year. (2) All of the data were adjusted for mergers. (3) Because equity data were reported for the beginning, middle, and end of the year, they had to be averaged to compute the return on equity. In computing the annual average of return on equity, the beginning and end of year values each received a weight of one-quarter, and the middle of year value received a weight of one-half. (4) Because the net income and equity data are not broken down by office, these variables had to be distributed among a bank's offices when a bank had offices in more than one local market. The variables were distributed according to each office's share of bank total deposits. For example, if an office had 30 percent of a bank's total deposits, it would be allocated 30 percent of the bank's net income and equity.