An Analysis of Changes in Bank Market Structure

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I. Introduction

The structure-performance analytical framework has provided the basis for numerous empirical investigations into the effects of industry concentration on profit performance.[1] Almost all of these studies have found a strong inverse relationship between industry concentration and performance.[2] Thus, it would appear that a public policy generally aimed at maintaining good economic performance should attempt to prevent, *ceteris paribus*, market concentration from increasing significantly.[3] The statistical relationship found between concentration and profitability, however, does not indicate what factors lead to higher (or lower) levels of concentration, and therefore, should receive special attention from the regulatory authorities who are charged with maintaining competitive markets. Consequently, it would be useful to identify those factors, especially those that can be influenced by the regulatory authorities, which cause market concentration to rise or fall.

While there have been several empirical studies of the industrial sector which have investigated changes in market concentration, they have been based on rather narrow hypotheses isolating growth and product differentiation as explanatory variables.[4] These studies, of course, provide a contribution to our knowledge of the functioning of the marketplace, but they are of limited usefulness for policy purposes because the regulatory authorities have, at present, little discretionary power over the isolated variables (growth and product differentiation).

This study undertakes an empirical investigation that attempts to determine those variables that have a significant influence on changes in market concentration. The study focuses on the banking industry because, as a result of its regulated status, there are more quantifiable factors which can be directly influenced in accordance with public policy objectives than in other industries.[5] The study is based on almost the entire universe of major commercial banking markets and employs multivariate regression analysis for testing purposes. Of greater importance among the explanatory variables in the analysis are mergers, holding company activity, and branching laws. Results for the merger variable are of particular interest because of the affect that mergers, most notably horizontal mergers, may have on market concentration. Thus, the results should provide some insight into the effectiveness of bank merger policy with respect to competition.[6]

II. Data and Variables

The statistical analysis focuses upon 228 ma-

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[1] For a survey of these studies, see Leonard Weiss [20]. A survey of studies of the structure performance relationship in banking has been done by George Benston [2].

[2] Many studies have used profitability as an indicator of performance–high profits reflecting socially poor performance arising from the exploitation of monopoly power. Relatively high profits in an industry are not likely to be merely a reflection of managerial efficiency, since the relatively high profits would attract more firms to the entry (thus drawing down the rate of return) unless there are *barriers* to new entry, which is an important characteristic of monopolistic markets.

[3] There will, of course, be some markets in which a relatively high level of concentration is necessary in order to achieve economies of scale. In such a situation, the regulatory authorities must weigh the cost associated with a certain amount of monopoly power against the social benefit arising from economies of scale.

jor banking markets and covers the period 1966-1972.[7] The year 1966 is the beginning year of the study because of data limitations in earlier years. While this yields a rather short time period for investigating changes in market structure (concentration) which typically changes slowly, this shortcoming is, at least partially, offset by the fact that the banking industry during this period was characterized by exceptionally rapid growth, the introduction of many new services, and a rapidly increasing number of consolidations. Consequently, changes in market structure could be expected to occur more rapidly than in a less dynamic period.

Since the primary purpose of this study is to isolate the factors that are statistically related to changes in market structure, the dependent variable in the analysis is change in concentration. The Herfindahl Index (based on deposits) has been selected as our basic measure of market structure because it is responsive to both the number and size distribution of firms,[8] and because it appears to be the only proxy for market structure that has been tied directly to oligopolistic conduct.[9] The dependent variable is thus calculated, for each market, as the change in the Herfindahl Index from 1966-1972.[10] Because the concentration ratio is a more commonly used (due to availability) measure of market structure, we have used the three-bank concentration ratio to calculate an alternative measure of change in market structure.

The independent variables in the analysis may conveniently be segregated into two groups, depending on the extent of control by state and federal regulators. The variables subject to control include bank mergers, bank holding company acquisitions, branching, and holding company laws. Those variables not directly subject to control include initial market structure, market growth, and size of banks.

The initial market structure, or initial level of concentration,[11] is included as an explanatory variable for two reasons. First, it reflects the discretionary power of firms in concentrated markets with respect to policies which influence entry, and therefore, changes in market concentration.[12] Firms in highly concentrated markets facing entry have two options. They may elect to restrict prices to a level that will not permit potential entrants to overcome any cost disadvantage and thus exclude them from the market. Alternatively, they may elect to ignore potential entrants and charge the monopoly short-run profit maximizing price. Their choice will depend on factors such as the elasticity of demand and their cost advantage over new entrants and the time lag for entry to take place. The longer the time lag, the more likely are existing firms to ignore potential entrants. Therefore, entry will eventually take place.[13] In banking, a state or federal charter is required for entry. The charters are difficult to obtain and involve considerable time lags. Thus, it does not seem likely that existing banks would limit their price to an extent that would prohibit entry. Rather, it may be more profitable for them to maintain high prices and let entry occur slowly over time.

The second reason the initial level of concentration is important is very simply that there is a greater opportunity for concentration to increase (decrease) in low (high) concentration in-

[4] See [13, 16, 10, 11, 21, 3]. The shortcomings of these studies, and a more complete analysis have been presented in Dalton and Rhoades [4].

[5] In a recent paper, Phillips [14] argues that regulatory policy is the major factor in determining market structure in the banking industry.

[6] While numerous studies in the manufacturing sector have found that competition is adversely affected by concentration, the evidence in banking is not so strong. Nevertheless, the evidence in banking is mounting as reflected in two recent studies [7, 8] which used very different data but reached the same conclusion; concentration has an adverse affect on competition.

[7] For this study, a major banking market is defined as a Standard Metropolitan Statistical Area (SMSA). The 228 SMSA's used in this study include 90 to 95 percent of all SMSA's in the United States. For a discussion of the SMSA as a reasonable banking market approximation, see *United States v. Philadelphia National Bank*, 374 U.S. 321 (1963). See also F. R. Edwards [6] and Donald Jacobs [9].

[8] The Herfindahl Index equals

$$H = \Sigma S_i^2 ,$$

where S is the market share of the ith firm. It can be shown that the Herfindahl equals $\sigma^2 + 1/N$ where σ^2

dustries than in high (low) concentration industries. This statistical problem may be reinforced by the attitude of the regulatory authorities, which tend to be more concerned about (and more strict toward) mergers in markets that are already highly concentrated than in other markets.

Growth of the market (measured by the change in total deposits from 1966 to 1972) is included as an independent variable for two complementary reasons. First, rapidly growing markets are more attractive for entry. Second, the regulatory authorities tend to look more favorably on the granting of new charters in rapidly growing markets because the need is more apparent, and they are less concerned about creating excessive competition.[14] Consequently, it is anticipated that concentration will decline more in rapidly growing markets than in other markets.

Average size of the dominant (three largest) firms in the market (1966) is the last of the independent variables not subject to direct regulatory control. This variable is included to account for the argument that the existence of large firms, because of their "deep pockets," may tend to inhibit aggressive behavior by smaller firms in the market as well as entry by potential entrants–thus reducing the likelihood that the dominance of the largest firms would be eroded away.[15] The positive influence on change in concentration of firm size may be offset by the fact that, in banking the large firms are found in large markets. And, as Bain [1] argued and Mueller and Hamm [12][16] recently found, large market size tends to facilitate new entry which would have a negative effect on changes in concentration.

The merger variable is a particularly interesting one because it is subject to control, and because merger activity can lead to a rapid alteration in market structure. In recognition of this latter possibility, among other things, legislation requires the banking authorities to review all proposed bank mergers and bank holding company acquisitions.[17] Moreover, the Courts have, in recent years, come to recognize that horizontal mergers (mergers involving firms in the same market) have an immediate adverse effect on market structure.[18] Thus, for example, the Supreme Court has taken a very strong position against horizontal mergers in the industrial sector in the Brown Shoe Case (1963) and in the banking industry in the Philadelphia National Bank Case (1963). If during their consideration of merger and acquisition applications, the regulators follow the Court's interpretation of Section 7, then bank mergers and acquisitions should not have a significant adverse effect on bank market structure. Thus, taking an optimistic view of bank merger policy, we expect that the merger variable will cause no change in market concentration.[19] The merger variable is measured by the total number of bank mergers and bank holding company acquisitions in each market that occurred during the period 1966-1972.[20]

Branching laws, which are also subject to control, may influence changes in concentration due to their effect on entry barriers. The branching laws will affect both entry by existing banks in other markets and by new firms. The states may be divided into three classes with respect to

represents the variance of firm market shares and N the number of firms.

[9] See George J. Stigler [17].

[10] Changes were calculated in two ways: (1) Herfindahl 1972 ÷ Herfindahl 1966, and (2) Herfindahl 1972 – Herfindahl 1966. The two measures yielded essentially the same results so that only the ratio (1) results are presented.

[11] Throughout this discussion of the independent variables we will refer to market structure or changes in market *structure* as concentration or changes in *concentration* because of the latter term's long standing usage in the literature.

[12] When changes in the concentration ratio are used to measure changes in market structure, there is an additional factor–namely, many highly concentrated industries are near the maximum value of the concentration ratio. Therefore, the concentration ratio cannot exhibit a large relative increase in these industries even though there may be pressure and, in fact, the industry may be becoming even more skewed toward the larger firms. However, in highly concentrated markets, concentration can fall significantly. Thus, there is a negative bias to the concentration variable. This problem does not arise with the Herfindahl Index that only reaches its maximum value with a pure monopoly.

branching–the unit banking states; those states that allow limited branching in contiguous areas (within SMSA's); and those states that allow branching throughout the state. Depending on the branching regulations, entry conditions will differ among markets. In statewide branching states, barriers to entry by established banks are low since banks in other markets can branch into the SMSA. However, entry barriers to new banks are high since the ability to branch gives existing banks the opportunity to usurp desirable locations from new banks. In unit banking states, existing banks are unable to usurp desirable locations. Barriers to entry by new firms are lower, but established firms are completely barred from entry. Therefore, there is some likelihood of entry in both statewide and unit banking markets. Entry into limited branching markets, therefore, should be most difficult, *ceteris paribus.* Regulations prevent banks established in other markets from entering via branches. Similarly, by branching within the market, existing banks are able to limit the likelihood of entry by new banks. Therefore, we expect concentration to remain unchanged or increase in limited branching areas relative to unit or statewide branching areas. We can be less sure of the effect between unit and statewide branching areas since it depends on the relative effectiveness of entry by established firms as compared to entry by new firms. Dummy variables are included to account for the differing branching laws.

In many states, multi-bank holding companies may allow firms to avoid branching restrictions. Using the bank holding company device, an organization may establish a *de facto* branch system to enter profitable markets. Therefore, we would expect concentration to tend to fall in markets in states that allow multi-bank holding companies. A dummy variable is included to account for entry by multi-bank holding companies.

III. Tests and Results

The estimated model, based on 228 observations using the linear form is:

$$\Delta C = f(C, G, SD, LB, UB, TMA, HC) ,$$

where

- ΔC = Relative change in the Herfindahl Index (or concentration ratio), 1966-1972;
- C = Initial Herfindahl Index (concentration ratio when appropriate);
- G = Percentage growth in total deposits in the SMSA, 1966-1972;
- SD = Average total deposits of the three largest banks;
- LB = 1 if market is in a limited branching state, 0 otherwise;
- UB = 1 if market is in a unit banking state, 0 otherwise;
- TMA = Total number of mergers and acquisitions in the market, 1966-1972; and
- HC = 1 if multi-bank holding companies are permitted, 0 otherwise.

Results of the analysis are presented in Table 1. Equations 1 and 2, using change in the Herfindahl Index as the dependent variable yield

[13] For a discussion of these issues, see Joe S. Bain [1].

[14] The initial concentration and growth variables have been successfully used in studies in the manufacturing sector. A recent study, which briefly reviews the literature in the area, is Dalton and Rhoades [4].

[15] See Corwin Edwards [5].

[16] In our sample, there was a very high correlation between size of dominant firms and size of market. Thus, only firm size was included as an independent variable to avoid multicollinearity difficulties. For a discussion and test of the size of market influence, see Willard F. Mueller and Larry G. Hamm [12].

[17] They must then approve or deny the proposal depending on their judgement as to the effect of the consolidation on competition and convenience and needs of the community.

[18] In some cases, the adverse affect associated with increased concentration may be offset by the beneficial effects of economies of scale.

[19] Market extension mergers (mergers involving firms in different markets) may lead to increases or decreases in concentration. There are hypotheses supporting both situations but at present there is no evidence.

[20] There were approximately 1600 consolidations during the period.

slightly better results than equations 3 and 4, where change in the three-firm concentration ratio is the dependent variable. The explanatory variables not directly subject to regulatory control are used alone in equations 1 and 3. The initial level of concentration (Herfindahl) has, as expected, a negative sign and is statistically significant at the one percent level. Thus, concentration tends to fall more or rise less in markets that begin the period at a relatively high level of concentration. Unfortunately, it is not possible to determine whether this result is due to the pricing strategy employed, or to the fact that there is an opportunity for greater relative decline in concentration in these markets, or to both. The market growth (G) variable is not statistically significant. While this finding is not consistent with the prediction, it is not surprising because of the shortness of the time period covered.

A similar finding for growth in the short run was made in the Dalton-Rhoades study, while their growth variable held up well for longer periods.[21] The average bank size (SD) variable, is significant but does not carry the positive sign predicted by the hypothesis that large firms because of their "deep pockets" tend to inhibit aggressive behavior by smaller firms as well as potential entrants. Instead, the results support the hypothesis that large markets (where large banks are generally found) tend to facilitate entry and expansion by smaller banks.

Explanatory variables subject to control by the regulators, i.e., branching laws, mergers, and multi-bank holding companies, appear in equations 2 and 4. Results for the limited branching dummy variable indicate that it is not statistically significant. This means that changes in market structure in states with limited branching laws are not different than in states that permit statewide branching (the omitted variable). However, results for the unit banking dummy are statistically significant, indicating that markets in unit banking states experience less increase or more decrease in concentration than markets in statewide branching states–and by inference, than markets in limited branching states. This result differs from our *a priori* expectations. It may result from the fact that unit banking markets generally have significantly more firms and thus a larger competitive fringe. The merger variable, measured by the total number of mergers and acquisitions, has no significant effect on changes in market structure in either of the equations in which it appears. It would appear, therefore, that bank merger policy has been, at least in the short run, fairly effective with respect to maintaining competition in banking markets.

Finally, results for the multi-bank holding company variable indicate that markets in states which permit multi-bank holding companies experience more of an increase in concentration than markets in other states. This is consistent with the finding, noted above, that states with liberal branching laws tend to experience more of a concentration increase than unit banking states.

IV. Conclusion

Several conclusions may be derived from this study. First, there is a great deal of randomness in the determination of market structure.[22] Thus, regulatory authorities also need to look to performance variables directly, as well as structural variables. Second, merger policy at present seems to be effective; at least, mergers do not lead to increases in concentration. Third, the results with respect to the holding company and branching variables suggest that statewide banking in the short run leads to increased concentration in local markets.[23]

These results may, however, be only true in the short run. Long run effects may strengthen the short run effects or may work in the opposite

[21] See Dalton and Rhoades [4]. Their study of 187 manufacturing industries covered the following time periods: 1947-1967, 1954-1967, and 1963-1967.

[22] For a discussion of this possibility, see F. M. Scherer [15, pp. 125-127].

[23] A better test of this hypothesis, however, would look at the effect of changes in the branching law. Our results are suggestive, however, that statewide branching does not have the expected result.

direction. Further research should be devoted to the long run determinants of market structure.

TABLE 1

CHANGES IN BANK MARKET STRUCTURE, 1966-1972

		Regression Coefficients of Independent Variables (t values in parentheses)								
Equation Number	Dependent Variable	Initial Concentration C	Market Growth G	Average Size of Largest Banks SD	Limited Branching Dummy LB	Unit Banking Dummy UB	Total Number of Mergers and Acquisitions TMA	Holding Company Dummy HC	Constant	R^2
1	ΔHerf.	−.346[a]	.002	−0.0001 *C*					0.999	.05
		(3.555)	(0.877)	(1.475)						
2	ΔHerf.	−.387[a]	.003	−0.0002 *C*	−.001	−.049[a]	.002	.036[b]	0.994	.07
		(3.555)	(1.070)	(1.371)	(0.858)	(2.425)	(0.108)	(1.879)		
3	ΔConc.	−.009[a]	−.003	−.0001 *C*					1.042	.03
		(3.047)	(0.230)	(1.559)						
4	ΔConc.	−.010[a]	−.001	−.0001 *C*	−.004	−.260[a]	.002	.149[c]	1.041	.05
		(2.782)	(0.040)	(1.500)	(0.588)	(2.337)	(0.211)	(1.407)		

[a]Indicates the coefficient is statistically significant at the one percent level (one tail test).
[b]Indicates the coefficient is statistically significant at the five percent level (one tail test).
[c]Indicates the coefficient is statistically significant at the ten percent level (one tail test).

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