SM 87-9

A Series of Occasional Papers in Draft Form Prepared by Members of the Research Department for Review and Comment

STAFF MEMORANDA

REEVALUATION OF THE STRUCTURE-CONDUCT-PERFORMANCE PARADIGM IN BANKING

Douglas D. Evanoff and Diana L. Fortier

FEDERAL RESERVE BANK OF CHICAGO

SM-87-9

Reevaluation of the Structure-Conduct-Performance Paradigm in Banking

by

Douglas D. Evanoff
and
Diana L. Fortier*

Research Department
Federal Reserve Bank of Chicago
July 1987

*The authors are Senior Financial Economist and Regulatory Economist, respectively, at FRB-Chicago. Helpful comments were provided by Herb Baer, Allen Berger, and Bruce Petersen. The views expressed are those of the authors and are not necessarily shared by the Federal Reserve Bank of Chicago.

Reevaluation of the Structure-Conduct-Performance Paradigm in Banking

I. Introduction

The expected relationship between market structure, bank conduct, and bank performance has been a driving force behind antitrust enforcement in the banking industry. However, recent studies indicate that this relationship may be misspecified and an antitrust policy which disallows bank mergers, based on the traditional S-C-P paradigm, may actually be counter-productive and lead to losses in economic welfare. This conclusion is based on what has been coined the "efficient structure" hypothesis which suggests that any positive relationship between market structure and profits occurs because structure is proxying for market share--i.e., an efficiency measure.

The purpose of this paper is to reevaluate the S-C-P paradigm in banking. Although both the "traditional" and "efficient structure" hypotheses are considered, they are viewed as potential complementary theories instead of substitutes, i.e., both forces can be operative. Shortcomings of previous studies are also addressed including the important role played by entry barriers, and the correct means of accounting for market structure. After accounting for these factors we find that bank profits are positively influenced by market share as proposed by the efficient structure thesis. In those markets characterized by significant entry barriers, profits are also shown to be positively influenced by market structure. However, this effect is not present in markets with lower entry barriers. In fact, we find that profit relationships should be analyzed separately for banks located in markets with different degrees of entry barriers. The results also suggest that the standard three-firm concentration ratio, commonly used in studies of bank performance, includes irrelevant firm shares.

The paper is divided into six sections. In the next section we briefly discuss the current status of the literature on the S-C-P paradigm and problems with previous analysis. In Section 3 we discuss our approach to the issue and present our expected results. The data are described and results from the empirical analysis are presented in Sections 4 and 5. The findings are then summarized and policy implications are discussed in the final section.

II. The Structure-Conduct-Performance Literature: Status and Shortcomings

The traditional S-C-P paradigm has been one of the most tested hypotheses in the industrial organization literature. The paradigm proposes that market concentration lowers the cost of collusion between firms and results in higher than normal profits for all market participants. Its validity, the basis for antitrust policy, has been espoused in numerous studies by the finding of a positive relationship between market structure and firm performance measures (Weiss 1974).

As a result of court decisions and legislation changes, the banking industry has been subject to antitrust legislation since the early 1960s. Since that time, studies evaluating the industry have been undertaken to provide bank regulators with information on the potential impact of bank mergers and acquisitions. Although not conclusive, the findings have been somewhat similar to those found in other industries.[1] They suggest an adverse social impact will result from bank merger activity which leads to increased market concentration; although the magnitude of the loss found in banking has been small relative to that found in other industries. However, numerous methodological problems have lead some to argue that the literature contains too many inconsistencies and contradictions to satisfactorily establish a S-C-P relationship (Gilbert 1984, and Osborne and Wendel 1983).

In recent years, alternative approaches to explain the link between market structure and performance have been undertaken. Brozen (1982), Demsetz (1973, 1974), Gale and Branch (1982), McGee (1974), and Peltzman (1977) argue that an industry's structure may exist as a result of superior efficiency in production by particular firms. Thus, these firms gain market share which results in increases in market concentration. However, greater than average profits accrue to these firms as a result of firm specific efficiency and resulting competitive superiority, rather than collusion as proposed by the traditional S-C-P paradigm. This "efficient structure" hypothesis has recently been applied to the banking industry (Smirlock 1985) with results that suggest that once firm specific efficiency is accounted for, market concentration adds nothing in explaining bank profits. Thus, high concentration levels are not necessarily considered to be indicative of collusive behavior, and regulatory actions aimed solely at curtailing concentration may actually decrease social welfare by not enabling firms to obtain production efficiencies.

Although there have been numerous studies of the basic S-C-P paradigm in banking, certain methodological and data problems persist throughout them (Gilbert 1984). These problems include limited data samples, incorrectly accounting for entry barriers, and ad hoc assumptions concerning the appropriate measure of market structure. Recent efforts to incorporate the efficient structure hypothesis have been enlightening, but the results are somewhat limited in value given similar methodological problems and unsubstantiated implicit assumptions. Some of these issues are addressed below.

III. Methodology and Expected Relationships

Theory emphasizes that a major determinant of firm profits is the existence of entry barriers (Bain 1951, 1956). The greater the cost of entry,

the easier it is for existing firms to maintain monopoly profits. As long as potential competitors have the ability to enter, profit levels will be dampened. In banking, where entry barriers are legislated, one has an ideal environment in which to test this impact. Quite surprisingly, the role of entry barriers in banking--such as branching restrictions--have generally been ignored or considered secondary in studies of the S-C-P paradigm. To avoid "difficulties" associated with branch banking, many studies include only banks located in unit banking areas (Brown 1985, Smirlock 1985, and Osborne and Wendel 1981). However, this is done at the cost of eliminating additional relevant information. Other authors account for entry barriers, but frequently do so by assuming lower entry barriers--the ability to enter by branching--enter the profit equation only as a shift parameter (Glassman and Rhoades 1980, Rhoades 1979, 1980, 1981, 1982, and Rhoades and Rutz 1979). The findings, though not conclusive, suggest that entry barriers do result in greater profits. However, employing a shift binary ignores the impact of barriers on the remaining explanatory variables. At the very least, lower entry barriers should be expected to influence profits by altering the impact of market structure. In areas with substantial barriers--unit banking areas--market power should be more easily exploited than in areas where market power could be contested with entry--liberal branching areas. Also, it is not obvious that only the impact of market concentration would be altered as a result of lower entry barriers. But speculation is not necessary since we can empirically verify whether the S-C-P paradigm should be separately tested for banks located in areas with different levels of entry barriers.[2]

An additional problem common to S-C-P studies in banking is the implicit assumptions concerning the appropriate market structure measure. Theory indicates a relationship between the level of output controlled by a few of the largest firms, and performance. However, the theory offers no information

on the absolute number or size distribution of firms necessary to exercise market power. The questions concerning what number of firms is too large to permit collusion, and what amount of output control is sufficient for price setting, are essentially empirical issues. In previous banking studies, an overwhelming number of authors have somewhat arbitrarily decided to use a three-firm concentration ratio.[3] This implicitedly assumes equal impact by the three leading firms. Nothing in the theory suggests the behavior of the top three firms is all-important to market performance and/or that their relative impact is equal. This assumption is a rather binding constraint which requires empirical verification. Utilizing nationwide manufacturing data, Kwoka (1979) found that the four-firm concentration ratio, commonly used in studies of these industries, included superfluous firms. If this same situation exists in banking studies, their conclusions and policy implications may be inaccurate.

In the next section we empirically test the issues introduced above. If entry barriers effectively protect market participants from competition, we would expect to find different profit relationships for firms located in areas with different entry barriers. Additionally, the traditional S-C-P hypothesis should more likely hold true in areas with greater barriers. However, the efficient structure hypothesis proposes that banks with a comparative advantage in production should obtain profits regardless of the extent of entry barriers. That is, even in concentrated markets, more efficient banks should reap additional profits beyond those achieved through cooperative behavior. Unlike pricing policies, cost structures will not be impacted by market structure. Finally, the commonly used and rather ad hoc assumption that the combined market share of the three leading firms, CR3, is the appropriate measure to capture market power will be empirically tested.

Following Smirlock (1985) and Weiss (1974) the traditional and efficient

structure hypotheses can be tested by estimating the profit relationship depicted in equation (1):

$$= \alpha_o + \alpha_1 CR + \alpha_2 MS + \sum \alpha_i X_i \qquad (1)$$

where is a profit measure, CR is a measure of market structure (commonly a concentration measure), MS is a measure of market share, and X is a vector of control variables included to account for firm and market specific characteristics. Influence from the traditional S-C-P paradigm alone can be verified by finding $\alpha_1 > 0$ and $\alpha_2 = 0$. Similarly, only the competing hypothesis would be supported if $\alpha_1 = 0$ and $\alpha_2 > 0$. However, there is no obvious reason to believe that both forces cannot both be operative simultaneously. The competing hypotheses will be tested and the additional concepts introduced above will also be considered.

IV. Data

This study employs 1984 bank financial, and market demographic information. The sample consists of over 6,300 unit banks located in the thirty states of the contiguous United States which permit either unit banking only, or statewide branching. Following the generally accepted definition used in previous bank studies, local geographic markets are assumed to be approximated by MSAs and non-MSA county boundaries. Use of unit banks avoids problems resulting from different cost structures between branch and unit banks.[4] Use of banks from states allowing unit banking only, or full statewide branching, creates a sample of banks operating under alternative extreme conditions of entry. This allows us to test arguments concerning the impact of entry barriers. This broad data base should produce results more capable of being generalized than is possible with numerous previous studies

which analyzed banks in a specific geographic region; even a single state. The broader base should decrease the potential for local market biases.[5]

The performance measure chosen is bank profits measured as the return on assets (ROA), i.e., net income after taxes, securities gains and losses, and extra ordinary items, divided by total assets. A number of factors render the ROA measure as preferable. Although other studies have used bank prices as the dependent variable, banking is a multiproduct business and individual prices may be misleading. Prices can be utilized only if costs are explicitedly accounted for as an explanatory variable. Even then, given the regulatory constraints on the industry, the expected structure-price relationship may not be realized for a particular service because of differing pricing strategies between banks. The potential for substantial cross subsidization between products obviously exists. Marketing strategies in certain markets may lead banks to charge low loan rates, but simultaneously pay relatively low deposit rates. The pricing strategy could obviously differ across markets. Use of the profit measure eliminates these potential problems.[6]

The independent variables include both market and firm specific variables. The included variables are similar to those utilized in previous studies. The traditional and efficient structure hypotheses are tested with the inclusion of market structure measures--concentration ratios--and firm specific market shares defined as bank deposits divided by total market deposits. A relative market share--deflated by the pertinent concentration ratio--is utilized in place of the absolute market share in equations testing the competing hypotheses. This has been shown to have preferred characteristics when included with market concentration ratios (Cotterill 1986), and is discussed later in more detail.

Several control variables, similar to those found in previous S-C-P studies, are included to hold constant other risk, cost, and demand factors which may impact profits. Since the profit measure is not risk adjusted, the capital-asset ratio (CAPAST) is included to account for differing risk levels between firms. Lower ratios indicate a relatively risky position suggesting we should expect a negative coefficient on this variable. Also included is the loan-to-asset ratio (LTOAST) which provides a measure of risk since loans are riskier than banks' other primary assets--government securities. Thus, we expect a positive relationship between this ratio and ROA. Further, bank size (ASSET) captures diversification potential. Larger banks' greater ability for loan and product diversification suggests an inverse relationship between size and profitability. However, this variable may also account for scale economies, suggesting a positive relationship. The impact of bank size is, therefore, indeterminant. A bank's relative cost of funds is accounted for with the ratio of demand deposits to total deposits (DDTODEP). Demand deposits are a relatively inexpensive source of funds, thus, we expect a direct relationship between this variable and bank profits.

Three explanatory variables are included to account for market demand characteristics--market size, market growth, and population density. Market size (MKTDEP), measured as total market deposits, is included to proxy market potential. Large markets should be more easily entered, ceteris paribus, and may have more sophisticated customers capable of more careful evaluation of service alternatives. This negative relationship with profits, however, may be partially offset if, as suggested by previous authors, banks in these markets take on riskier portfolios requiring higher returns. The sign on MKTDEP is, therefore, indeterminant. A similar uncertainty exists with respect to the impact of recent growth patterns of the banking market (MGROW). If market growth is unanticipated or can be exploited without fear

of rival entry, profit opportunities should occur for existing firms. However, if growth encourages entry, the net result may be to depress the profits of all market participants. The expected sign on MGROW is therefore also indeterminant. The population density measure (POPD) is included to account for demographic differences. Although commonly included in studies of other aspects of bank behavior, demographic factors have seldom been included in profitability studies. The more concentrated the population the more potentially profitable the market, thus, a positive coefficient is expected on this variable. Finally the ability to expand via holding company expansion is accounted for with a binary variable (HCLAW) equal to one if liberal expansion is allowed, zero otherwise. This should carry a negative coefficient if this means of expansion increases competition.

V. Empirical Results

Given equation 1 and the above discussion, the regression equation to be estimated is presented as equation (2):

$$\begin{aligned} ij = {} & \alpha_0 + \alpha_1(CR_j) + \alpha_2(MS_{ij}) + \alpha_3(CAPAST_{ij}) + \\ & \alpha_4(MKTDEP_j) + \alpha_5(MGROW_j) + \alpha_6(POPD_j) + \alpha_7(ASSET_{ij}) \\ & + \alpha_8(HCLAW_j) + \alpha_9(DDTODEP_{ij}) + \alpha_{10}(LTOAST_{ij}) \end{aligned} \qquad (2)$$

where,

ij = bank i's profits in market j--measured as the return on assets,

CR_j = concentration ratio in market j,

MS_{ij} = market share measure (alternatively, absolute or relative share),

$CAPAST_{ij}$ = capital-to-asset ratio,

$MKTDEP_j$ = market deposits,

$MGROW_j$ = market growth rate--1980 to 1984 growth rate of market deposits,

$POPD_j$ = population density,

$ASSET_{ij}$ = bank assets,

$HCLAW_j$ = binary variable equal to = 1 if liberal holding company expansion is allowed, zero otherwise,[7]

$DDTODEP_{ij}$ = ratio of demand deposits to total deposits, and

$LTOAST_{ij}$ = loan-to-asset ratio.

We initially test the traditional S-C-P hypothesis incorporating the impact of market barriers. This was done by estimating equation (2), excluding the market share variable, separately for banks located in unit banking areas and those located in liberal branching areas--i.e. statewide branching states.[8] Again, in the past it has been common to jointly estimate equation (2) for unit banks in each area. This assumption of stability across bank markets with significantly different entry barriers should be verified.

Results from estimating the traditional paradigm for the two subsamples are presented in Table 1 as equations (a) and (b). For consistency with most previous studies, a three-firm concentration measure is included (CR3). Equation (a) is most comparable to previous studies since it analyzes unit banks in areas with high entry barriers. The impact of the control variables is generally consistent with expectations. Lower capital ratios (CAPAST) and loan-to-asset ratios (LTOAST) lead to higher bank profits. Less expensive sources of funds (DDTODEP), a fast growing market (MGROW), and a more concentrated population in the market (POPD) also result in greater profits. The variable depicting market size (MKTDEP) enters with a negative sign supporting the contention that entry is more viable in larger markets and consumers are perhaps more sophisticated in evaluating bank alternatives. The coefficient on the bank size (ASSET) variable also has a negative sign, although the t- value indicates it is insignificant. Similar results for bank size were found in previous studies and may imply that bank risk elements are more accurately captured directly by the capital and loan ratios. Finally, the liberal holding company legislation binary variable (HCLAW) enters

negatively reinforcing the contention that the potential for holding company expansion spurs competition.

Given the impact of the control variables, the coefficient on CR3 in equation (a) supports the traditional S-C-P hypothesis and the sign and magnitude of the coefficient are similar to those found in previous studies of bank profitability. Thus, employing a methodology similar to that used by previous authors, we generate similar results suggesting that previous studies evaluating bank profits in areas with high entry barriers--unit banking areas--may not be excessively biased by the use of limited geographic samples. Equation (a), however, offers no insight on the impact of entry barriers and the validity of the alternative efficient structure hypothesis.

Equation (b) in Table 1 presents results from a test of the traditional hypothesis for unit banks located in markets with less restrictive entry barriers. If barriers matter, the impact of the explanatory variables may differ from that found for banks in markets with protective barriers. Indeed, the relationship in equation (b) is generally inferior in terms of the significance of the individual model parameters or their combined impact on profits. CR3 does, however, have a significant positive impact on bank profits suggesting, tentatively, that the traditional hypothesis also holds true in these markets. Additional tests support the need to analyze the profit relationship separately for banks located in markets with different degrees of entry barriers. Thus, previous studies accounting for this difference with only a shift binary would appear to be misspecified. Analysis of the coefficients suggest the affect of concentration and the impact captured in the intercept term result in higher profit levels being achieved in markets with entry barriers.[9]

The influence of lower entry barriers is thought to be responsible for some of the inferior results of equation (b) compared to equation (a). For

example, the expected sign on (MGROW) was positive because of the ability of banks to benefit from market growth. This was realized in equation (a) only. However, while this impact may be expected in protected markets, easy entry in markets without barriers may attract new banks and substantially decrease the benefits of market growth to any individual bank. This has been found to be true in other industries (Cotterill 1986). The lack of protection from new entrants may also impact the remaining control variables.

The results discussed above support the traditional S-C-P hypothesis and add credence to the role of entry barriers. However, recent studies have emphasized the role of firm efficiency as an alternative explanation of firm profits. To test this, the firm specific relative market share was included in equation (2) producing results presented in Table 1 as equations (c) and (d). While the inclusion of this variable does not impact the influence of the control variables, it does impact the overall relationship as it enters with a strong positive influence, and market concentration becomes insignificant.[10] This occurs in all markets regardless of the degree of entry barriers.

Earlier, it was hypothesized that firm efficiency would enable a bank to obtain higher profits regardless of the level of entry barriers. It was also argued that excessive profits resulting from a concentrated market structure could only be realized in unit banking markets since potential entry in markets allowing liberal branching would make collusion difficult, if not impossible. However, the results reported as equations (c) and (d) reinforce the results of previous findings (Smirlock 1985) and support the efficient structure hypothesis only.[11]

As stated earlier, CR3 has commonly been used in previous bank studies as a measure of market structure. In actuality, CR3 has no apparent theoretical superiority over alternative measures and its appropriateness should be

empirically verified. Employing CR3 also implicitedly assumes equal influence by each of the top three firms in the market. While this may be a tenable assumption, it also should be verified. If inappropriate structure measures have been utilized, as has been found in other industries (Kwoka 1979), these assumptions may have biased the findings.

The appropriateness of the use of CR3 as the proper market structure measure can be tested by replacing CR3 with the market shares of the top three firms in each market. This allows us to evaluate the marginal influence of each of the three leading banks. The results from this procedure are presented in Table 2. The first set of estimates is for banks located in markets with entry barriers, and the second set is for banks in markets with low barriers. Results are presented in a stepwise manner to show that the marginal impact of additional shares is the same whether entered in the stepwise fashion or in one equation--as in equation (c) or (f).

The results for banks in markets with barriers--equations (a), (b), and (c) of Table 2--indicate that the share of the leading firm is apparently the driving influence on profits. The coefficient on the market share of the second and third largest bank is relatively small and is clearly insignificant. The second and third leading firms appear to have no systematic role in determining bank profits suggesting a dominant firm type arrangement.[12] While the sign on the share of the second leading firm suggests a potential for some degree of countervailing power by larger competitors, the statistical test indicates this is not significant. Apparently, the extent of market control of the largest bank impacts profits of all banks in the market.[13] The assumption of equal coefficients on MS1 through MS3 is obviously not supported in the results. Additional tests also found it unjustified.[14]

The results presented in Table 2 for the sample of banks in liberal branching areas are, again, not as good as those for the sample of banks with entry protection. While the share controlled by the largest firm is shown to have a significant positive influence on profit rates, the influence of the remaining leading firms is not as clearcut. Although the share of the second firm appears to have no influence on profit rates, the third firm's share enters positive and significant. While the reasons for this are not obvious, it may result as the leading firms find it advantageous to cooperate if all three are relatively equal sized competitors. Whereas a leading firm may dominate if it has superior market share compared to all but one other rival, a more equal distribution of shares may lead market leaders to decide cooperation is most profitable. In any case, whereas it is relatively clear that CR1 is the most appropriate measure of market structure for banks in markets with entry barriers, it is not as clear in the subsample with few entry barriers.[15]

Now that the appropriate market structure measure has been obtained by evaluating the sequential impact of leading firms, the competing hypotheses can be retested. Once again, given contestability arguments, for markets with significant entry barriers both market structure and firm specific efficiency are expected to lead to greater profits. For banks located in markets without these barriers only firm efficiency should matter since entry will eliminate any collusive profits.

Based on the information in Table 2, the competing hypotheses were retested using CR1 as the measure of market structure. The results for banks in markets with entry barriers--equation (a) in Table 3--suggests that when the proper market structure measure is employed, both firm specific efficiency and market structure positively influence profits. This is in accord with our expectations.

The findings for banks in markets without barriers also coincide with our expectations. The results presented in Table 2 make the choice of the appropriate market structure measure less precise. However, the problem is moot because similar results are obtained regardless of the measure used. CR1 is included in equation (b) of Table 3 and is found to have no discernible influence on profitability. Likewise, we earlier analyzed the same relationship utilizing CR3 as our structure measure and found no influence of structure using this measure (Table 1, equation (d)). Relative market share, however, is shown to have a positive influence on estimates for this subsample of banks in either specification.

These results imply that the efficient structure hypothesis is applicable to the banking industry and influences bank profits in all markets. In markets where entry barriers are prevalent, the lack of contestability or potential rivalry enables all market participants to obtain additional profits. A brief analysis of the magnitude of the coefficients presented in Table 3 is also revealing. Temporarily ignoring levels of significance, the coefficient on CR1 is substantially larger in markets where barriers preclude entry. The impact of market structure is more than ten-fold that realized when these barriers are removed. Conversely, the impact of firm specific efficiency--measured as relative market share--is significantly more important in areas with relatively easy entry. This may occur because it is the only means available to banks in these markets to obtain above average profits. In markets with barriers, some means of cooperation can also be practiced to enhance profitability. However, the impact of firm specific efficiency in these protected markets is not minimal. In fact, the impact of firm specific efficiency actually exceeds that of market structure.

VI. Conclusions

Most previous studies of the S-C-P paradigm in banking have found a weak positive relationship between structure and profits. However, these studies are frequently criticized for being plagued with methodological problems and for ignoring relevant information concerning bank markets. We have attempted to improve upon those studies by emphasizing the significant role of entry barriers on the relationship, determining the "proper" market structure measure, utilizing more inclusive and current data, and allowing for the traditional S-C-P hypothesis and efficient structure hypothesis to both be operative. Our results categorically support the efficient structure hypothesis. However, we also find the role of entry barriers to be significant in evaluating the impact of structure on profits. Market structure is found to positively influence profits only in markets with higher entry barriers, and here the impact is again relatively small. Additionally, barriers are shown to influence the impact of other variables in determining profits. This has obvious regulatory implications for evaluating merger activity. Finally, the three-firm concentration ratio, frequently used in previous studies is shown to include shares of non-influential firms. A less aggregated measure appears more useful in explaining profits.

While the findings add support to recent efforts to liberalize geographic restrictions in banking--via holding company or branch expansion--they in no way imply that antitrust regulation is unwarranted; only that analysis of factors beyond concentration ratios, and a significant evaluation of entry barriers is needed. Further research is needed to determine the source of the efficiency or product differentiation particularly in light of past bank cost studies showing insignificant scale economies.

Footnotes

[1]Surveys of bank S-C-P studies include Rhoades (1977, 1982), Heggestad (1979), and Gilbert (1984).

[2]The approach taken here is similar to that taken by Mullineaux (1975) in evaluating economies of scale in banking. Prior to that effort, it was common for studies of bank costs to pool unit and branch bank data, therefore, assuming the cost equation coefficients were identical for branch and unit banks. His results showed otherwise. While the inclusion of multiplicative binary variables for all behavioral variables would be an alternative means to account for differential impacts, collinearity problems generally make this impractical.

[3]For evidence of this see Table 1 of Gilbert (1984).

[4]Cost differences have been shown to exist, e.g., see Berger, Hanweck and Humphrey (1986); Benston, Hanweck and Humphrey (1982); Flannery (1983); and Mullineaux (1975). Bank financial data are from June 30, 1984 Reports of Condition. Market share and concentration data are from FDIC Summary of Deposits as of June 30, 1984. Population data are from the 1980 decennial census, Bureau of the Census. The uniqueness of MSA definitions in Virginia created problems in separating metropolitan from non-metropolitan area banks in the state. Thus, Virginia banks were dropped from the sample. This, in addition to other edits due to missing data, left a sample of 6323 banks.

[5]In his critique of previous S-C-P studies in banking, Rhoades (1981) expressed concern about the generality of results found in previous studies because of the use of limited samples. Brown (1985) questioned the conclusions of Smirlock (1985) because the limited sample, and excessively high CR3, did not actually allow the author to distinguish between the competing hypotheses.

[6]Numerous authors have supported the use of ROA as the appropriate performance measure (Brown 1985, Rhoades 1985, 1981, Gilbert 1984). It is preferred to return on equity because of the significant discretion individual banks have in dividing capital between debt and equity. Holding company affiliates also have alternative means to improve capital positions unavailable to non-affiliated banks. Thus, equity values may not be comparable between the two groups of banks, therefore, bank assets is a more "common" denomination. However, Smirlock found somewhat similar results employing either of three profit measures--i.e., return on assets, equity, and capital.

[7]By liberal we mean expansion via multibank holding company is <u>allowed</u>. Multibank holding company affiliation was also included as a binary variable by Smirlock. However, it had not been included in previous studies and was excluded here because of concern that it was highly correlated with the holding company law binary. However, additional regressions found that the exclusion of the holding company binary had no impact on the regression results.

[8]Banks located in limited branching states were excluded to emphasize the polar entry conditions. However, banks in these areas have also been shown to behave oddly at times as a result their restrictions (Evanoff 1985). This may be expected to alter the S-C-P relationship in these markets. However, additional analysis including unit banks located in these areas resulted in very similar findings and are available from the author on request.

[9]The need to separately analyze banks in markets with different entry barriers was verified by the rejection of a Chow test; F=6.1 compared with a critical value of $F_{9,6323} = 2.4$. That greater profits result with barriers holds true even if the intercept term in equation (b) is set equal to zero (as suggested by the t value). Utilizing mean values for all explanatory variables, the predicted return on asset levels were .88 for bank with barriers, .62 for banks in liberal branching areas. Results using the Herfindahl index as the market structure measure in equation (a) and (b) were slightly superior to those using CR3. Use of this index, however, precludes tests of the competing hypotheses since, by definition, a collinearity problem would exist.

[10]Relative market share, i.e., market share divided by the pertinent CR measure, is included to decrease potential multicollinearity problems. The simple correlation between CR3 and market share is significantly larger than that between CR3 and relative market share. In S-C-P studies of non-bank industries, the relative market share has been offered as the appropriate theoretical counterpart of market concentration (Cotterill 1986, Marion, et. al. 1979). Collinearity has been a concern of most authors evaluating the competing hypotheses when considering the inclusion of both CR and absolute market share in regression models (Cotterill, Shepard 1986, Brown 1985, Rhoades 1985). However, Smirlock found no evidence of collinearity problems from his casual inspection of the results (including correlation coefficients), or more sophisticated evaluation techniques. In fact, Smirlock even included an interaction term to test whether CR and MS tended to move in the same direction which, if true, would make any test of the traditional hypothesis ambiguous. Inclusion of this variable would appear, almost by definition, to pose a collinearity problem. However, quite surprisingly, Smirlock still found no evidence of deteriorating collinearity. His findings may be due to sample selection. A similar interaction term was included in the current analysis and collinearity induced degradation of the estimates was evident. Utilizing the technique introduced by Belsley, Kuh, and Welsch (BKW 1980), condition indexes (CI) and variance decomposition proportions (VDP) were calculated and evaluated to detect near dependencies and determine the variables involved. One near dependency was detected (CI=37 versus a critical value of 30) for the subset of banks in unit banking states and the variables involved were the absolute market share (VDP=.91 versus a critical value of .5) and the interaction term (VDP=.94). Similar results were also found for the subset of banks in states with few entry barriers (CI=47, VDP=.98 and .99 for the same variables). Analysis of the results reported in Table 1--employing relative market share when included with CR--show no sign of deteriorating collinearity.

[11]There is disagreement in the literature as to whether a significant positive coefficient for market share actually implies firm specific efficiency is the driving force determining profits (Smirlock 1984, Shepard 1986). To consider this issue in more detail, alternative tests of the

efficient structure hypothesis were also undertaken. Leading firms in each market were dropped from the data (to insure they alone are not driving the results) and the ratio of the market shares of the leading bank (dropped bank) to the individual banks was included in place of CR3 and MS. Profits should vary inversely with this ratio if efficiency is driving profits, i.e., the more efficient the leading firm, the more profits will be squeezed for the smaller, less efficient firms. Although somewhat mixed, the findings tend to support the efficient structure hypotheses--i.e., a negative coefficient is found although it is not statistically significant in markets with low entry barriers. Additionally, operating expense-to-asset ratios were generated and correlated with relative market share values for each market. Negative correlations would suggest that leading firms have cost advantages. The results again support the efficiency argument. 75% of all markets had negative correlation coefficients, and 22% of all markets had negative correlations which were statistically different from zero--found utilizing t-tests and 10% levels of significant. Only 4% of markets produced a significant positive correlation. The evidence is even stronger when a weighted average is used, i.e., the number of banks in markets with significant negative correlations. The results were strikingly similar for sub-samples of the data, e.g., banks in unit areas, statewide branching areas, rural markets, urban markets, etc.

[12]Only the top three organizations were considered because it was expected that if CR3 was an inappropriate measure, it erred by incorporating too many banks. Additionally, numerous markets have four or fewer banks. Kwoka (1979) found CR2 to be more appropriate than CR4 using nationwide markets. Although less inclusive alternatives to CR3 have occasionally been utilized in previous research efforts, most are somewhat dated, offer no reason for employing the specific CR measure, employ a limited sample, find no significant differences when alternatives are employed (Kaufman 1966), and use different performance measures (Fraser and Rose 1976, Klein and Murphy 1971, Rose and Fraser 1976, Rose and Scott 1979).

[13]This would appear to be consistant with price leadership behavior where the leader has the capability to retaliate against dissenters. Rhoades (1981) attempted similar permutations of CR1, CR2, etc., and surprisingly, found no advantages over CR3. He does not, however, discuss his procedure in detail.

[14]Equation (c) in Table 2 is essentially a disaggregated version of equation (a) in Table 1. We tested whether the coefficients for MS1 equaled that for MS2 and MS3. Employing an F test we rejected the assumption of linearity imposed by the use of CR3.

[15]It has been suggested that the results may be driven by rural banking market observations. Two methods were used to test for this possibility. First, potentially influential observations were obtained via the single row deletion technique developed by BKW (1980) and were dropped from the data. Reproduction of Table 3 resulted in very similar results; i.e., similar coefficients and standard errors. Second, the data were disaggregated into four subsamples, i.e., rural and urban markets, with and without branching barriers, and Table 2 was reproduced. In three of the four samples the influence of adding market shares beyond MS1 was insignificant. In urban markets with significant entry barriers the influence of the second firm's share was negative. This is similar to the finding of Kwoka and suggests a greater degree of countervailing power in these markets.

Literature Cited

Bain, Joe S. "Relation of Profit Rates to Industry Concentration." Quarterly Journal of Economics 55 (August 1951), 293-324.

_____. Barriers to New Competition. Cambridge: Harvard University Press, 1956.

Belsley, David A., Edward Kuh, and Robert Welsch. Regression Diagnostics: Identifying Influential Data and Sources of Collinearity. New York: Wiley, 1980.

Benston, George J., Gerald A. Hanweck, and David B. Humphrey. "Scale Economies in Banking: A Restructuring and Reassessment." Journal of Money, Credit, and Banking 14 (November 1982), 435-56.

Berger, Allen N., Gerald A. Hanweck, and David B. Humphrey. "Competitive Viability in Banking: Scale, Scope, and Product Mix Economies." Research Papers in Banking and Financial Economics, Financial Studies Section, Division of Research and Statistics, Board of Governors of the Federal Reserve System, January 1986.

Brown, Donald M. "The Relationship between Concentration and Profitability in the Banking Industry." Unpublished manuscript, presented at the Midwest Finance Association Conference, 1985.

Brozen, Yale. Concentration, Mergers, and Public Policy. New York: Macmillan, 1982.

Cotterill, Ronald W. "Market Power in the Retail Food Industry: Evidence from Vermont." The Review of Economics and Statistics 68 (August 1986), 379-386.

Demsetz, Harold. "Industry Structure, Market Rivalry, and Public Policy." Journal of Law and Economics 16 (April 1973), 1-9.

_____. "Two Systems of Belief About Monopoly." in Harvey J. Goldschmid, H. Michael Mann, and J. Fred Weston, Editors, Industrial Concentration: The New Learning (Boston: Little, Brown, and Company, 1974).

Evanoff, Douglas D. "The Impact of Branch Banking on Service Accessibility." Staff Memoranda No. 9. Chicago: Federal Reserve Bank of Chicago (1985).

Flannery, Mark J. "Correspondent Services and Cost Economies in Commercial Banking." Journal of Banking and Finance 7 (March 1983), 83-99.

Fraser, Donald R., and Peter S. Rose. "Static and Dynamic Measures of Market Structure and Performance of Commercial Banks." Journal of Economics and Business 28 (Winter 1976), 79-87.

Gale, Bradley T., and Ben S. Branch, "Concentration versus Market Share: Which Determines Performance and Why Does it Matter?" The Antitrust Bulletin (Spring 1982), 83-105.

Gilbert, R. Alton. "Bank Market Structure and Competition." Journal of Money Credit and Banking, 16 (November 1984), 617-645.

Glassman, Cynthia A., and Stephen A. Rhoades. "Owner vs. Manager Control Effects on Bank Performance." Review of Economics and Statistics 62 (May 1980), 263-70.

Heggestad, Arnold A. "A Survey of Studies on Banking Competition and Performance." In Issues in Financial Regulation, edited by Franklin R. Edwards, pp. 449-90. New York: McGraw-Hill, 1979.

Kaufman, George G. "Bank Market Structure and Performance." Southern Economic Journal 32 (April 1966), 429-39.

Klein, Michael A., and Neil B. Murphy. "The Pricing of Bank Deposits: A Theoretical and Empirical Analysis." Journal of Financial and Quantitative Analysis 6 (March 1971), 747-61.

Kwoka, John E., Jr. "The Effect of Market Share Distribution on Industry Performance." The Review of Economics and Statistics 61 (February 1979), 101-109.

Marion, B., W. Mueller, R. Cotterill, F. Geithman, and J. Schmelzer, The Food Retailing Industry. New York: Praeger, 1979.

McGee, John. "Efficiency and Economies of Size." In Industrial Concentration: The New Learning, edited by H. Goldschmid, H. M. Mann, and J. F. Weston, pp. 55-97. Boston: Little, Brown, and Company, 1974.

Mullineaux, Donald J. "Economies of Scale in Financial Institutions: A Comment." Journal Monetary Economics 1 (April 1975), 233-40.

Osborn, Dale K., and Jeanne Wendel. "Research on Structure, Conduct, and Performance in Banking, 1964-1979." Research Paper 83-003, College of Business Administration, Oklahoma State University, July 1983.

Peltzman, Sam. "The Gains and Losses from Industrial Concentration." Journal of Law and Economics 20 (October 1977), 229-63.

Rhoades, Stephen A. "Structure-Performance Studies in Banking: A Summary and Evaluation." Staff Economic Studies No. 92. Washington, D.C.: Board of Governors of the Federal Reserve System, 1977.

_____. "Nonbank Thrift Institutions as Determinants of Performance in Banking Markets." Journal of Economics and Business 32 (Fall 1979), 66-72.

_____. "Monopoly and Expense Preference Behavior: An Empirical Investigation of a Behaviorist Hypothesis." Southern Economic Journal 47 (October 1980), 419-32.

_____. "Does Market Structure Matter in Commercial Banking?" Antitrust Bulletin 26 (Spring 1981), 155-81.

_____. "Structure-Performance Studies in Banking: An Updated Summary and Evaluation." Staff Economic Studies No. 119. Washington. D.C.: Board of Governors of the Federal Reserve System, 1982.

_____. "Market Share as a Source of Market Power: Implications and Some Evidence," Journal of Economics and Business, 37 (December 1985), pp. 343-63.

Rhoades, Stephen A., and Roger D. Rutz. "Impact of Bank Holding Companies on Competition and Performance in Banking Markets." Staff Economic Studies No. 107. Washington, D.C.: Board of Governors of the Federal Reserve System, 1979.

Rose, Peter S., and Donald R. Fraser. "The Relationships between Stability and Change in Market Structure: An Analysis of Bank Prices." Journal of Industrial Economics 24 (June 1976), 251-66.

Rose, Peter S., and William L. Scott. "The Performance of Banks Aquired by Holding Companies." Review of Business and Economic Research 14 (Spring 1979), 18-37.

Shepard, William G. "Tobin's q and the Structure-Performance Relationship: Comment." American Economic Review 76 (December 1986), 1205-10.

Smirlock, Michael. "Evidence on the (Non)Relationship between Concentration and Profitability in Banking." Journal of Money, Credit, and Banking 17 (February 1985), 69-83.

Smirlock, Michael, Thomas Gilligan, and William Marshall. "Tobin's q and the Structure-Performance Relationship." American Economic Review 74 (December 1984), 1050-60

Weiss, Leonard W. "The Concentration - Profits Relationship and Antitrust." In Industrial Concentration: The New Learning, edited by H. Goldschmid, H. M. Mann, and J. F. Weston, pp. 184-233. Boston Little, Brown, and Company, 1974.

Table I

S-C-P Paradigm: The Competing Hypotheses

Equation	Geographic Branching Status	Intercept	CR3	CAPAST	MKTDEP	MGROW	POPD	ASSET	HCLAW	DDTODEP	LTOAST	MS	F	R^2
(a)	Unit Banking	1.1672† (7.6)	.0029† (2.5)	-.0230† (4.8)	-.0116† (3.3)	.2741† (2.0)	.0002† (2.2)	-.0023 (0.1)	-.1352† (2.7)	.0225† (8.8)	-.0013† (8.5)		19.9	.030
(b)	Liberal Branching	-.5613 (0.7)	.0197† (2.7)	-.0134* (1.6)	-.0138 (1.3)	-.8927* (1.6)	.0001 (0.6)	2.2202 (1.4)	-.5013 (1.5)	.0293† (3.5)	.0003 (0.5)		3.8	.057
(c)	Unit Banking	1.1790† (7.7)	.0001 (0.1)	-.0190† (3.9)	-.0108† (3.1)	.2670† (2.0)	.0002† (2.2)	-.0339 (0.7)	-.1402† (2.8)	.0230† (9.0)	-.0013† (8.3)	.6396† (5.3)	20.8	.035
(d)	Liberal Branching	-.0026 (0.0)	.0056 (0.7)	-.0116 (1.4)	-.0109 (1.1)	-.8851* (1.6)	.0001 (0.2)	1.785 (1.1)	-.5955* (1.8)	.0326† (3.9)	.0007 (1.0)	2.1536† (3.3)	4.6	.074

†Coefficient significant at the 5 percent level
*Coefficient significant at the 10 percent level

Table 2

S-C-P Paradigm: Impact of Sequential Market Shares

Equation	Geographic Branching Status	Intercept	MS^1	MS^2	MS^3	CAPAST	MKTDEP	MGROW	POPD	ASSET	HCLAW	DDTODEP	LTOAST	F	R^2
(a)	Unit Banking	1.2354† (9.2)	.0042† (3.1)	-	-	-.0233† (4.9)	-.0111† (3.1)	.2625† (2.0)	.0001* (1.9)	-.0022 (0.1)	-.1390† (2.8)	.0225† (8.8)	-.0013† (8.5)	20.3	.031
(b)	Unit Banking	1.2538† (8.6)	.0042† (3.1)	-.0009 (0.3)	-	-.0233† (4.9)	-.0112† (3.1)	.2595† (1.9)	.0001* (1.8)	-.0022 (0.1)	-.1372† (2.7)	.0224† (8.8)	-.0013† (8.5)	18.2	.031
(c)	Unit Banking	1.2168† (7.4)	.0046† (3.0)	-.0011 (0.4)	.0021 (0.5)	-.0233† (4.9)	-.0113† (3.2)	.2641† (2.0)	.0002* (1.9)	-.0021 (0.1)	-.1366† (2.7)	.0225† (8.8)	-.0013† (8.5)	16.6	.031
(d)	Liberal Branching	.3132 (0.5)	.0167† (2.3)	-	-	-.0134* (1.6)	-.0109 (1.1)	-1.0028* (1.9)	.0000 (0.1)	2.2386 (1.4)	-.5183 (1.6)	.0289† (3.5)	.0003 (0.5)	3.6	.053
(e)	Liberal Branching	.1412 (0.2)	.0170† (2.4)	.0069 (0.5)	-	-.0133* (1.6)	-.0116 (1.1)	-.9615* (1.8)	.0001 (0.2)	2.2373 (1.4)	-.5280 (1.6)	.0288† (3.5)	.0003 (0.5)	3.2	.054
(f)	Liberal Branching	-.9176 (1.0)	.0252† (3.0)	.0052 (0.4)	.0496† (2.0)	-.0136* (1.7)	-.0137 (1.3)	-.9419* (1.7)	.0001 (0.6)	2.1831 (1.3)	-.4277 (1.3)	.0303† (3.6)	.0004 (0.6)	3.3	.060

†Coefficient significant at the 5 percent level.
*Coefficient significant at the 10 percent level.

Table 3

The Competing Hypotheses: Utilizing The Appropriate Market Structure Measure

Equation	Geographic Branching Status	Intercept	CRI	MS	CAPAST	MKTDEP	MGROW	POPD	ASSET	HCLAW	DDTODEP	LTOAST	F	R^2
(a)	Unit Banking	1.0914† (7.9)	.0023* (1.7)	.2978† (4.7)	-.0191† (3.9)	-.0105† (2.9)	.2692† (2.0)	.0002† (2.2)	-.0330 (0.7)	-.1413† (2.8)	.0232† (9.1)	-.0013† (8.2)	20.5	.035
(b)	Liberal Branching	.1221 (0.2)	.0003 (0.1)	1.8735† (4.3)	-.0105 (1.3)	-.0097 (1.0)	-.9242* (1.7)	.0000 (0.1)	1.4993 (0.9)	-.6201* (1.9)	.0346† (4.2)	.0009 (1.4)	5.2	.084

†Coefficient significant at the 5 percent level.
*Coefficient significant at the 10 percent level.