The Determinants and Performance Effects of Rivalry in Local Banking Markets

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Abstract

High concentration is expected to facilitate collusion and result in less intense rivalry and excessive profitability. In banking, most research investigating this hypothesis has focused on the relationship between concentration and profitability. Possible simultaneity is acknowledged, but typically ignored. This paper investigates the relationship between concentration, rivalry, and profitability from 1980 to 1984 using a simultaneous equation framework. The sample consists of 105 rural financial markets in the states of Ohio, Kentucky, and West Virginia. Contrary to the results obtained in previous studies, concentration affected neither rivalry nor profitability in the expected manner. Rivalry was found to have the expected negative effect on profitability. Profitability was found to have a plausible, significant coefficient in the estimated rivalry equation. Although the findings may reflect the sample and time period examined, they do suggest that nonstructural conduct measures may be useful indicators of market performance and, pending additional more definitive research, merit consideration as additional relevant factors in antitrust analysis.

Introduction

The focus of antitrust policy on changes in market concentration reflects the view that market structure is a critical determinant of firm conduct and, ultimately, firm performance, particularly in regulated industries such as banking.[1] In the standard industrial organization paradigm, high concentration is expected to facilitate collusive behavior and thus result in diminished competitive rivalry and excessive prices and profitability in more concentrated markets.

In banking, researchers have attempted empirically to verify the existence of this hypothesized structure–conduct–performance (S–C–P) relationship in a large number of studies using two basic methodological approaches. In the majority of studies, reduced form performance equations are estimated using single equation estimation techniques, most often ordinary least squares (OLS). In the typical

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[1]This is because barriers to entry can be substantial in such industries.

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specification, an accounting profitability measure is the dependent variable, while a concentration index is the explanatory variable of primary interest in the estimated equation. The conduct or rivalry link in the S–C–P chain is ignored. Focusing on the relationship between structure and performance and the use of OLS reflects the implicit assumptions that each link in this causal chain is stable and that simultaneity is unimportant and can be ignored.

A precise characterization of the results of this body of empirical work is somewhat difficult.[2] In general, a significant positive relationship between measures of concentration and bank prices and profitability has been found in some, but not all, studies. In a number of cases, the magnitude of the market structure effect was found to be slight.

An alternative methodological approach has been used in a more limited number of studies. In this research, the aim is to determine if firm conduct or rivalry is related systematically to market concentration.[3] This approach may yield more conclusive statistical evidence on the concentration–collusion hypothesis (particularly in industries such as banking where nonprice competition is important) because the problems associated with accounting rate-of-return performance measures are avoided.[4] The rivalry indicators employed are various measures of changes in the ranking, identity, or variation in the shares of a market's dominant firms. Again, single reduced form equations are estimated using multiple regression, reflecting the assumption that causality runs in one direction, from structure to conduct. In general, measured rivalry is found to be lower in concentrated markets.

More research on both the determinants and performance impacts of rivalry in financial (and nonfinancial) markets appears to be warranted at this time. Relatively little research on the relationship between structure and rivalry has been conducted to date. Only two studies have been performed recently. In one (Sandler, 1988), the focus is airline markets. In the other (Bodenhorn, 1990), the sample consists of banks, but the time period examined is prior to the Civil War. The relationship between rivalry and performance remains largely unexplored. Investigation of the relationship between rivalry and performance is important because such investigation would provide insight on the value of the alternative rivalry proxies used in previous structure–conduct studies and the

[2]For example, the conclusions reached in Rhoades (1982) and Gilbert (1984) differ considerably, although they both look at the same basic body of research.

[3]In banking, the seminal piece is Heggestad and Rhoades (1976). Also see the more recent study of the airline industry by Sandler (1988).

[4]For a discussion of some of the problems associated with various performance measures, see Stevens (1990).

merits of the reported findings.[5] Possible simultaneity between rivalry and profitability has been acknowledged by several researchers, but this issue has not been explored in any of the previous empirical work in this area.[6]

Further, many previous studies, particularly those investigating the relationship between market structure and rivalry, were completed prior to 1980. Many neglected interindustry competition.[7] Thus, a great deal of this research examined periods in which price competition for deposits was prohibited and S&L asset and liability powers were restricted, impeding their ability to compete with banks. Both of these circumstances were changed dramatically by the DIDMCA in 1980 and the Garn–St. Germain Act in 1982. Many studies, particularly those looking at the structure–rivalry relationship, examined only urban markets.

This paper provides additional empirical evidence on the relationship between market structure and rivalry and between rivalry and performance using a sample of 105 rural financial markets in Ohio, Kentucky, and West Virginia, states located in the Fourth Federal Reserve District. S&Ls are incorporated into the analysis in a simple, straightforward fashion. In the calculation of the explanatory variables used in the study, both banks and S&Ls are included, and the deposits of each are given equal weights.[8] These relationships are examined from 1980 to 1984.

Two basic equations, a rivalry equation and a profitability equation, are viewed as a simultaneous system and are estimated using two stage least squares. Briefly, concentration was not found to be a significant determinant of either rivalry or of profitability. A significant, plausible, inverse relationship between profitability and rivalry was detected. Further, profitability was found to be a significant determinant of rivalry in the simultaneous framework. Some effort was made to determine if the key results were sensitive to changes in model specification or the estimation sample. This did not appear to be the case. These

[5]The significance of the findings reported hinges on the adequacy of the rivalry proxies employed. Researchers have assumed that greater rivalry will be reflected in higher values of the proxies used while acknowledging the possibility that intense competition could result in a stalemate. Stalemated competition implies low values for the proxies typically used. The type of relationship detected between the rivalry measures and profitability would provide insight on the validity of the assumption.

[6]Possible simultaneity is mentioned in Marlow and Wright (1987, p. 174). See also Rhoades and Rutz (1982, p. 362). Liang (1989) presents arguments in favor of a simultaneous equation framework.

[7]The exception is Marlow and Wright (1987), where a commercial bank market presence variable is employed as an explanatory variable in a S&L profitability equation.

[8]Currently, S&L deposits receive a minimum weight of 50 percent in the calculation of market concentration indexes in the antitrust analysis done by the Federal Reserve. The weighting is higher in cases where thrifts are judged to be more like banks, e.g., are engaged heavily in commercial lending.

findings, however, could be influenced by the specification adopted, the nature of the relatively small sample, and short time period examined. Further research using a larger, more representative sample and examining more recent postderegulation time periods is necessary to determine the robustness of these results.

Review of Previous Studies Examining Rivalry

Relatively few studies of rivalry in financial markets have been conducted to date. A summary description of these studies, listed in chronological order, is contained in Table 1. Most of these are similar in form to the seminal piece done by Heggestad and Rhoades published in 1976. In this and most of the other works, samples of commercial banks are used. Just two studies use samples of savings and loans (S&Ls). Generally, in both the bank and S&L studies, the market presence of the competing class of institution is ignored. Five of the six banking studies and both S&L pieces examine rivalry only in urban markets. The most recent sample period examined in any of these studies is 1979.

In seven of the eight studies, various alternative measures of market rivalry are employed as the dependent variables in the estimated equations. Three different types of measures of market rivalry have been used in these studies: mobility, turnover, and market share instability. These measures typically focus only on the dominant firms in each market. Mobility is the sum of the rank changes occurring among the market leaders over some arbitrarily chosen multiyear period. Turnover is a complementary measure of rivalry and is defined to be the number of times a firm originally outside the dominant group moves into the group over some specific multiyear interval, displacing a formerly larger rival. Because each of these two measures fails to capture certain dimensions of rivalry, the sum of market mobility and turnover measures also is used as a more comprehensive rivalry measure in most studies.

In several studies, because of concerns that mobility and turnover are inappropriate or imperfect proxies for rivalry, a market share instability measure of rivalry also is employed. More precisely, the absolute value of the percentage change in the market share of each dominant firm in a market over some interval of time is calculated, and then these measures are summed cross-sectionally. The market share instability variable reflects both positive and negative changes in dominant firm market shares and is larger in markets where the share increase of one large firm comes at the expense of another large rival, rather than at the expense of a smaller fringe firm.

In all of these studies, the assumption is that a direct relationship exists between the intensity of competition and the value of each of the computed measures of rivalry. In each of these studies, market concentration is viewed as

one of the key determinants of rivalry. Typically, a three firm concentration ratio is the market structure measure employed. In all of these studies, single equation estimation techniques are used. A negative, significant relationship between concentration and measured rivalry is observed.

Rivalry measures are used as explanatory variables in equations constructed to explain profitability measures of firm performance in only a single empirical study (Marlow and Wright, 1987). Their sample consists of S&Ls located in urban areas. They find a negative, significant relationship between S&L profitability and market rivalry.

Sample and Methodology

The Sample

In the current study, the sample consists of 105 rural banking markets located in Ohio, Kentucky, and West Virginia. These states are part of the Fourth Federal Reserve District.[9] Thus, the market rather than the individual bank is the unit of analysis.[10] Following standard practice, rural banking markets are approximated by counties. All rural counties in each state that had three or more bank competitors as of June 1984 are included in the sample. In one sense, the focus on rural markets is beneficial because rivalry in rural markets has been explored in only a single dated study. A sample consisting solely of rural markets could affect the empirical results, however, although the precise direction of bias is unclear. On the one hand, concentration is typically high in such markets and entry is less common. Competition from out–of–market and nonbank suppliers of financial services is likely to be limited. Thus, market structure may be a more significant determinant of rivalry and performance in rural areas than it is in urban ones. On the other hand, it is possible that concentration levels in a large number of the sample markets are above critical levels, implying effective monopolization. If this is the case, one might not observe the expected relationship between concentration and either rivalry or performance. This possibility is explored below.

[9]The focus was on only these three states for several reasons. First, Fourth District data were most easily accessible to the author. Second, accurate competition of rivalry measures over appreciable lengths of time is extremely tedious and time consuming. It should be noted that one Fourth District state, Pennsylvania, was excluded from the sample. This was done because of a material change in its bank branching law in 1982, midway through the period.

[10]On the basis of her empirical results, White (1984) argues that this approach is preferable to a micro approach (i.e., using individual bank data) when one is investigating the structure–performance relationship.

The Key Variables

The variables of interest in the study are market concentration, rivalry, and profitability. A Herfindahl–Hirschmann index (HHI) of concentration is used as the measure of market structure. This measure is correlated highly with the three firm concentration ratio used in most previous work, but the HHI better reflects differences in both the number of competitors and distribution of shares of competitors across markets, particularly rural banking markets. Further, HHI is the index used in antitrust analysis by banking regulators and the Department of Justice. The precise measure employed is an average of the 1980 and 1984 values of the index for each market.

Opinions vary concerning the best rivalry proxy. Some argue that changes in the ranks and identity of the leading firms in a market are superior rivalry indicators.[11] There are, however, several problems with these types of measures. One is that they are particularly sensitive to the relative disparity of firm sizes in each market. Rivalry almost certainly implies market share variation or instability. But substantial market share variation among firms in a market could occur and often will not be reflected in either measured mobility or turnover. Thus, a market share instability measure seems superior on conceptual grounds. A market share instability measure of rivalry has another practical advantage over mobility and turnover measures, particularly when rivalry in local financial markets is being investigated. In this type of study, measured mobility and turnover will assume a limited number of values, often zero. This makes estimation of equations involving these types of measures more complicated and perhaps less informative than those in which market share instability measures are used.

In this study, a market share instability measure is used to proxy rivalry. More particularly the sum of the absolute value of the percentage change in the market shares of the three largest organizations in each market is calculated, first over the 1980–1982 time period and then over the 1982–1984 period. These two measures then are summed to produce a market share instability index for each market for the entire 1980–1984 period.

Presumably, the more intense competitive rivalry is in a market, the greater the variability in the market shares of the dominant firms and the higher the constructed index of share instability.[12]

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[11]For a justification of this view, see Heggestad and Rhoades (1976, p. 446). Later (pp. 448-449), they argue in favor of the sum of mobility and turnover. See also Bodenhorn (1990).

[12]To determine if the results were sensitive to the rivalry measure employed, the equations were reestimated substituting the sum of market mobility and turnover for market share instability. No significant change in the reported results was observed.

The market profitability variable used in this study is the mean value of after tax returns on assets for all single market banks in each county calculated from 1980 to 1984. Single market banks are those with all offices located within their home office county. Single market banks are used to ensure that the profitability measures constructed reflect local market structure and conditions.

The Equations

For convenience and to facilitate comparison of the results with those reported in previous studies, the specifications of the rivalry equation and profitability equation adopted here are close to those used by previous researchers. In the rivalry equation, the market share instability measure is the dependent variable and is assumed to be related to market concentration and several other explanatory variables. The form of the rivalry equation, with the exception of the added profitability term, is close to that used by Heggestad and Rhoades and has the following general form:[13]

$$R_i = R\ (CR_i,\ MG_i,\ MGRDUM_i,\ BRDUM_i,\ HC_i,\ PROF_i)$$

where:

R_i = Market share instability measure of rivalry in the ith market;
CR_i = HHI measure of concentration in the ith market;
MG_i = Percentage change in total deposits in the ith market over the 1980–1984 period;
$MGRDUM_i$ = Dummy variable equal to one if an intramarket merger occurred in the ith market over the 1980–1984 interval, otherwise equal to zero;
$BRDUM_i$ = Dummy variable equal to one if *de novo* bank branching across county lines is permitted in the state in which the ith market is located, otherwise equal to 0;
$HCDUM_i$ = Dummy variable equal to one if a holding company affiliate is present in the ith market, otherwise equal to zero; and
$PROF_i$ = Measure of profitability in the ith market.

If collusive behavior does occur in more highly concentrated markets and if more intense rivalry is reflected in greater market share instability, a negative

[13]For example, the explanatory variables in the rivalry equation estimated by Heggestad and Rhoades were concentration, market deposit growth, the average size of the three largest banks, a branching dummy, the number of holding companies in the market, and the value of deposits in the market recently acquired.

coefficient should be observed on the concentration variable in the rivalry equation.

The expected coefficient on the market growth term is positive. Rapid growth encourages entry and disturbs the relationships between incumbent firms, both of which should result in greater share instability.

The MGRDUM variable is included to control for market share changes due simply to intramarket merger activity and to statistically distinguish such changes from share instability due to the competitive initiatives of incumbent firms. The expected sign of this variable is positive.

The BRDUM variable is included to control differences in bank branching powers across states. *De novo* bank branching across county lines is permitted in Ohio, but not in Kentucky or West Virginia. The coefficient on the branching dummy is expected to be positive for two reasons. One is that market share instability should be higher in markets where *de novo* bank entry occurs, and this is easier and more likely in states where branching across county lines is permissible. The other is that potential competition may be higher in states with more liberal *de novo* branching laws.[14]

Several researchers have suggested that the presence of holding company affiliates in a market could influence rivalry. Both positive and negative potential impacts have been hypothesized.[15] For example, holding company affiliates might stimulate rivalry because their management is more aggressive and/or they can call on the greater resources of a larger consolidated organization. Alternatively, holding company affiliates might reduce rivalry due to some sort of linked oligopoly effect. Thus, the expected sign of this variable is ambiguous.

Market profitability is included in the list of potential explanatory variables in the rivalry equation to obtain insight on whether there is some feedback between profitability and rivalry. Rivalry should be more intense, *ceteris paribus*, in more profitable markets.

The other type of equation estimated has market profitability as the dependent performance variable. The most important explanatory variables in this equation are market concentration and market rivalry. Other standard control variables also are included on the right side of this equation. This equation has the following simple form:

$$PROF_i = PROF\ (R_i, CR_i, MG_i, MKTS_i, MKTYGR_i)$$

[14]The impact of actual entry on rivalry also was investigated. None of the dummy and nondummy variables employed were found to be even marginally significant. This may be because of the relatively short time horizon examined. Bodehorn (1990) argues in a recent study that actual entry stimulates rivalry only with a substantial lag.

[15]See Rhoades and Rutz (1982).

where:

$PROF$, R_i, CR_i, and MG_i, = Defined as above;
$MKTS_i$ = Measure of the size (end of period total market deposits) of the ith market; and
$MKTYGR_i$ = Growth in market per capita personal income over the 1980–1984 interval.

Assuming that greater market rivalry is reflected in higher values of the constructed market instability measure, the expected coefficient on the rivalry measure in the profitability equation should be negative.

If collusion does occur in concentrated markets, the coefficient on the CR term should be positive in the profitability equation.

Market profitability should be higher in more rapidly growing markets. Similarly, the sign of the coefficient on MKTYGR should be positive. The MKTS variable has been used in many previous studies to control intermarket differences in demand elasticity. Demand typically is assumed to be more elastic the larger the size of a market. Thus, the coefficient on this variable is expected to be negative.[16]

Two features of the specification of the equations should be emphasized before proceeding to a discussion of the estimation results. Concentration is viewed as an exogenous determinant of both rivalry and profitability.[17] And again, it should be noted that one major difference between this and previous studies is that the explanatory variables used here are computed giving equal weight to S&Ls. For example, commercial bank and S&L deposits are considered and given equal weight in the calculation of the market HHI variables used in the analysis.

Empirical Results

The rivalry and profitability equations were estimated as a simultaneous system using the technique of two stage least squares. The results appear in Table 2. The accompanying R^2 values and F–statistics indicate that the overall explanatory power of each equation is significant.

One of the most interesting findings evident in Table 2 is the absence of the expected relationship between concentration and either rivalry or profitability. In

[16]This is the expectation in the recent study by Clark (1988).

[17]In a recent study, Amel and Liang (1989) find evidence that profitability is a determinant of concentration. They find that the speed with which concentration responds to profitability, however, is slow. Their results suggest that the assumption that concentration is exogenous over the four year period examined in this study is reasonable.

the rivalry equation, the coefficient on the HHI concentration variable is positive, rather than negative, and marginally significant.[18] This result is somewhat surprising, as a negative, significant relationship between concentration and rivalry has been found in virtually every previous study, although the detected relationship is typically weaker in studies when market share instability measures of rivalry are used in place of mobility or turnover measures. Similarly, the estimated coefficient on the concentration variable is negative and marginally significant in the estimated profitability equation. The general expectation is that this coefficient should be positive. The failure to find support for the concentration–collusion hypothesis in either the rivalry or profitability equation could be due to any of a number of factors. As noted above, it could be due to the large number of rural markets in the sample. Concentration levels in the sample of rural markets are relatively high and if the concentration–collusion hypothesis is correct, it is possible that enough markets in the sample effectively are monopolized to blur the expected relationship.

To obtain insight on this issue, the sample was split into two subsamples, one consisting of highly concentrated markets (bank–only HHI values above 3000), the other of less concentrated markets. The categorization of the sample markets was made using the most recent empirical evidence on a critical concentration level in banking available.[19] The equations then were reestimated for each subsample. Neither the relationship between concentration and rivalry nor concentration and profitability were materially different from that reported for the complete sample for either subsample.[20]

The second notable finding concerns the estimated coefficient on the rivalry proxy in the profitability equation. In this case, the results conform to *a priori* expectations. The sign of the coefficient is both negative and significant, indicating that profitability is lower in markets where market share instability is greater and rivalry more intense. This result also did not change when the equations were reestimated using the high and low concentration subsamples.

The third key finding involves the profitability variable in the rivalry equation. The results demonstrate that profitability is a significant determinant of

[18]The results did not change when three firm concentration ratios were used in place of the HHI measure.

[19]See Daskin and Wolken (1989). In this study, a critical concentration level was detected at a Herfindahl index value (defined using only commercial bank deposits) of approximately 3000. In the current study, 62 of the sample markets had HHI values (bank only) above 3000. The mean and median values were 3170 and 3271, respectively. When S&L deposits are considered, however, only 21 of the markets exhibit HHI values above 3000. The HHI mean and median values are 2430 and 2368.

[20]In addition, quadratic concentration terms and critical level concentration dummies also alternatively were tried in the estimated equations to determine if the effect of concentration on either rivalry or profitability was nonlinear. Neither approach yielded significant results.

rivalry, confirming that a simultaneous specification is appropriate. The coefficient on the profitability variable has a reasonable positive sign.

Turning briefly to the other explanatory variables in the rivalry equation, only the coefficients on the merger dummy and the holding company presence dummy are statistically significant, the latter marginally so. The coefficients' signs are plausible. One result that is surprising at first glance is the insignificance of the estimated coefficient on market deposit growth. In previous studies, market growth consistently was found to have a significant positive effect on rivalry. Further analysis, however, revealed that this finding may hinge on model specification. When the rivalry equation used in this study is estimated using OLS, the coefficient on the market growth term becomes positive and significant, as others have found. The coefficient on the profitability variable becomes negative and insignificant. Thus, the evidence presented here suggests that ignoring simultaneity can have a significant effect on the reported results when the relationships between structure, conduct, and performance variables are explored in empirical work.

In the profitability equation, the estimated coefficients on the other explanatory variables generally exhibit the expected signs and are statistically significant. The exception is the negative coefficient on the market income growth variable. The reason for this finding is unclear.

Summary and Conclusions

A number of conclusions can be drawn from the reported findings. First, concentration is an unreliable indicator of both rivalry and performance, at least for this sample of rural markets over the time period examined. The findings reported above also suggest that bank regulators should examine rivalry or some other measure of conduct in addition to concentration levels when they must determine if proposed mergers and acquisitions are likely to have anticompetitive effects.

Additional research on rivalry seems warranted because rivalry appears to be related to performance in the expected manner. Yet relatively little research on this topic has been performed to date. In particular, reexamining the relationships that were the focus of this study over different, more recent time periods using an expanded sample with urban markets may prove to be informative. One interesting extension in future work would be to introduce a measure of risk into the analysis to determine if, and how, a risk variable alters the results.[21] At any rate, the results present here suggest that possible simultaneity should be

[21]Liang (1989) recently found a significant relationship between risk and profitability in a simultaneous equation model of the structure-performance relationship.

considered in any subsequent analysis, as failure to do so can have an important influence on the empirical findings.

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Table 1
Previous Studies of Financial Market Rivalry

Study	Time Period and Sample	Comments
Heggestad & Rhoades (1976)	1966–1972 228 urban banking markets, nationwide	Rivalry dependent, S&Ls ignored
Whitehead (1978)	1974 47 banking markets	Rivalry dependent, S&Ls ignored
Rhoades (1980)	1968–1974 184 urban banking markets, nationwide	Rivalry dependent, S&Ls ignored
Rhoades & Rutz (1981)	1972–1978 181 urban and 133 rural banking markets, nationwide	Rivalry dependent, S&Ls ignored
Rhoades & Rutz (1982)	1970–1979 154 urban banking markets, nationwide	Rivalry dependent, S&Ls ignored
Marrow *et al.* (1984)	1976–1979 99 urban S&L markets, nationwide	Rivalry dependent, bank variables included
Rhoades & Heggestad (1985)	1972–1978 154 urban banking markets, nationwide	Rivalry dependent, S&Ls ignored
Marlow (1987)	1976–1979 124 urban S&L markets, nationwide	Profitability dependent; rivalry and bank presence measures are explanatory variables

Table 2
Two Stage Least Squares Estimates of
the Rivalry and Profitability Equations
(N = 105)

	Dependent Variable			
	Rivalry		Profitability	
Variable	Coefficient	T–Statistic	Coefficient	T–Statistic
CR	0.00007607	1.73*	–0.00012667	–2.69**
MG	0.00061067	0.21	0.00968536	3.65**
BRDUM	0.01665222	0.25		
MGRDUM	0.38947842	4.44**		
HCDUM	0.07992024	1.30		
MKTS			–0.00048930	–2.66**
MKTYGR			–4.90778824	–2.90**
PROFHAT	0.50745314	1.90*		
RHAT			–0.56147341	–2.25**
INTERCEPT	–0.46838303	–1.51	1.76166041	6.98**
F–Statistic		4.93		5.00
R–Squared		0.23		0.20

* Significant at the 10 percent level
** Significant at the 5 percent level

PROFHAT and RHAT are the fitted values of PROF and R obtained from the first stage of the estimation procedure