CONCENTRATION IN BANKING AND ITS EFFECT ON BUSINESS LOAN RATES*

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IN recent years, we have seen a renewed interest in the problem of competition among banks. An increasing number of bank mergers has brought forth new legislation, such as the Bank Holding Company Act (1956) and the Bank Merger Act (1960), which directs regulatory agencies to preserve competition in banking. At the same time, it has become apparent that there is little or no empirical evidence on the relationship between bank performance and market structure. This paper aims chiefly at determining whether or not market structure or concentration has any effect on commercial bank performance. It is considered to be the groundwork from which it is hoped will spring more sophisticated techniques for handling the conceptual difficulties here encountered.

It seems reasonable to begin an analysis of bank competition with what is undoubtedly the most delimited borrower market, the market for small business loans. There are fewer borrower alternatives for small business loans than for almost all other bank services. Business loans are also, of course, the most important component of commercial banks' loan portfolios. An investigation of this market provides an estimate of the upper bound of departures from competitive conditions. If no evidence of market power can be found in markets for business loans, other bank services for which there are more substitutes are not likely to display monopolistic practices.

This paper attempts to test two hypotheses: (1) that, *ceteris paribus*, the level of business loan rates is higher in markets having relatively high concentration; and (2) that, *ceteris paribus*, business loan rates are less flexible in markets having relatively high concentration. In testing these hypotheses, an attempt is made to distinguish the effect of market structure from other regional differences, such as those of loan demand, bank costs, type of banking, etc. This paper seeks to probe the following questions:

(1) What is a competitive market structure?
(2) What is the quantitative effect of a given change in concentration, such as might result from a bank merger?
(3) What determines the spatial market for bank loans?
(4) Does branch banking have an effect on market performance different from that of unit banking?
(5) How should market structure be measured?
(6) Do banks which possess market power behave differently than competitive banks over the business cycle?

The Data

The data used in this analysis are taken from two Business Loan Surveys conducted by the Federal Reserve System. The Surveys were taken on October 5, 1955, and October 16, 1957, and are in the form of a stratified probability sample of two thousand member banks representing about thirty per cent of all member banks and ninety-three per cent of the volume of their business loans.[1]

The Loan Surveys cover all loans for business purposes. This includes not only loans classified in the Member Bank Call Report as commercial and industrial but also those classified as real estate loans which were made for commercial and industrial purposes. The banks sampled were asked to report effective interest rates on each loan by adjusting nominal rates for the type of repayment method employed. They also reported the size of loan, the asset size of borrower, and the maturity of each loan.

From these Surveys, forty-nine metropolitan areas — statistical metropolitan areas (SMA) as defined by the Census — are selected for analysis in this study. Banks within these

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[1] "Business Loans of Member Banks," *Federal Reserve Bulletin* (April 1956), 337–340.

forty-nine areas account for approximately forty per cent of all business loans in the nation. This percentage is impressive in view of the fact that New York City, which alone accounts for twenty per cent or more of business loans, is not included among the forty-nine areas. Although the Surveys include sixty-five distinct metropolitan areas, some are eliminated *a priori*. For example, Minneapolis is eliminated because of the extent of "group" banking in the area. Any conventional measure of market structure in such an area would not accurately reflect the true market structure. New York City, Newark, and other areas located within that congested region are eliminated because it is believed that they could not be treated as separate and distinct markets. Other areas are eliminated for lack of adequate data. Of the forty-nine areas selected, fifteen are located in unit-banking states, twenty-three in limited-branching states, and eleven in state-wide-branching states.

Market Area Delineation

The 1955 Business Loan Survey contains information on the location of banks and their respective borrowers. The 1957 Survey does not include this information. The Survey shows that small borrowers located in metropolitan areas tend to borrow very large proportions of their total loans from banks located in the same areas. The following table indicates that as borrowers become larger, they tend to be less restricted in respect to their sources of loans.

TABLE 1. — AVERAGE PERCENTAGE OF TOTAL LOANS OF METROPOLITAN BORROWERS WHICH IS BORROWED ONLY FROM BANKS LOCATED IN THE SAME METROPOLITAN AREA, BY SIZE OF BORROWER

Asset Size Class of Borrower	Percentage of Loans
$5–25 Million	46.8
$1–5 Million	73.7
$250 Thousand–$1 Million	91.1
$50–250 Thousand	94.1
$1–50 Thousand	89.3

Table 1 shows that for borrowers with less than $1 million of assets the Standard Metropolitan Area seems to constitute essentially the entire market area, or at least the "outer boundary" of it. Uncertainty about the market area for borrowers of over $1 million in assets is one of the reasons this study is restricted to small borrowers.

Looking at the market area from the point of view of the lender, table 2 shows that a large proportion of bank loans made to small borrowers is made to borrowers located in the same metropolitan area.

TABLE 2. — AVERAGE PERCENTAGE OF TOTAL LOANS BY METROPOLITAN BANKS MADE TO BORROWERS LOCATED IN THE SAME METROPOLITAN AREA, BY SIZE OF BORROWER

Asset Size Class of Borrower	Percentage of Loans
$5–25 Million	58.1
$1–5 Million	72.1
$250 Thousand–$1 Million	81.2
$50–250 Thousand	83.7
$1–50 Thousand	83.8

Measuring Market Structure

The measure of market structure or concentration used in this study is the percentage of total SMA deposits held by the largest three banks in each metropolitan area in 1956. For the eleven state-wide branching areas, however, different concentration ratios are used because of the difficulty of determining which deposits originate at which branch offices. The first concentration ratio is a "state ratio." It is the percentage of total deposits in a state accounted for by the largest three banks in that state. This value would seem to understate the degree of market power for a particular SMA. The second concentration ratio used for state-wide branching areas, called an SMA ratio, is the percentage of total deposits in an SMA held by the largest three banks when the deposits of the largest bank are deflated by a factor derived from the ratio of total SMA deposits to total state deposits. This measure would appear to overstate the degree of market power for a particular SMA. The rationale behind this procedure is that if both values can be used alternatively in a statistical analysis and both can be shown to be significant, then any value between these limits should also be significant.

Hypothesis I — The Level of Loan Rates

The first hypothesis to be tested states that, *ceteris paribus*, business loan rates will be higher where market power is greatest. After

accounting for differences in cost and demand among markets, is the degree of market concentration a significant factor in explaining levels of loan rates? To appraise its significance, the technique of multiple regression analysis is employed.

Table 3 summarizes the findings with respect to effective interest rates on business loans for different size borrowers. Effective interest rates (X_1) are correlated with the following variables: two concentration ratios expressing the percentage of deposits held by the largest three banks in each SMA — X_2 being the ratio which gives the lowest value for state-wide branching areas and X_3 being the ratio which gives the highest value; X_4, the average size of loan (in thousands of dollars) for the same size class of borrowers in each SMA; X_5, the percentage change in manufacturing employment from May 1950 to November 1955, for the respective SMA;[2] X_6, the percentage of total loans in each SMA with maturities of under a year for the same size class of borrowers; X_7, the form of bank organization, branch or unit; and X_8 and X_9, two variables to represent the population of each SMA. Where:

X_1 = effective interest rates on business loans for borrowers of a given size;
X_2 = percentage of deposits held by the largest three banks (low estimate for state-wide branching areas);
X_3 = percentage of deposits held by the largest three banks (high estimate for state-wide branching areas);
X_4 = average size of loan (in thousands of dollars) for a given size class of borrower;
X_5 = percentage change in manufacturing employment for each SMA from 1950–1955;
X_6 = percentage of total loans to borrowers of a given size class with maturities of less than a year;
X_7 = form of bank organization: (1) branch; (0) other, unit and limited branch;
X_8 = dummy variable for size of community, 200–500 thousand population;
X_9 = dummy variable for size of community, over a million people.

TABLE 3. — EFFECTIVE INTEREST RATES ON BUSINESS LOANS — BY SIZE OF BORROWER

Regression equation number	X_1 Effective interest rates on business loans for borrowers with assets of:	b_2 [a]	b_3 [a]	b_4	b_5	b_6	b_7	b_8	b_9	a	R^2
	1955										
1	$1 thousand–$1 million	0.0059 (0.0016)	0.0062 (0.0017)	− 0.0145 (0.0035)	0.0040 (0.0010)	− 0.0082 (0.0023)				5.2558	0.6328 d.f. = 44
2	$1 thousand–$50 thousand	0.0179 (0.0050)		− 0.0571 (0.0108)	0.0047 (0.0031)	− 0.0042 (0.0044)				4.8052	0.3612 d.f. = 44
3	$50 thousand–$250 thousand	0.0070 (0.0021)		− 0.0329 (0.0075)	0.0041 (0.0012)	− 0.0020 (0.0021)				5.1554	0.5391 d.f. = 44
4	$250 thousand–$1 million	0.0024 (0.0015)	0.0040 (0.0015)	− 0.0025 (0.0016)	0.0038 (0.0009)	− 0.0074 (0.0021)				4.9651	0.4796 d.f. = 44
5	$1 thousand–$1 million	0.0066 (0.0017)		− 0.0137 (0.0036)	0.0036 (0.0010)	− 0.0081 (0.0023)	0.1001 (0.0796)			5.1757	0.6459 d.f. = 43
6	$1 thousand–$1 million	0.0065 (0.0018)		− 0.0145 (0.0036)	0.0041 (0.0011)	− 0.0080 (0.0025)		− 0.0313 (0.0775)	0.0386 (0.0832)	5.1983	0.6384 d.f. = 42
	1957										
7	$1 thousand–$1 million	0.0010 (0.0016)	0.0022 (0.0016)	− 0.0135 (0.0051)	0.0054 (0.0010)	− 0.0058 (0.0024)				5.9079	0.5858 d.f. = 44
8	$1 thousand–$50 thousand	0.0074 (0.0057)		− 0.0255 (0.0105)	0.0059 (0.0033)	− 0.0138 (0.0069)				6.9353	0.3218 d.f. = 44
9	$50 thousand–$250 thousand	0.0031 (0.0022)		− 0.0186 (0.0144)	0.0071 (0.0015)	− 0.0060 (0.0028)				5.7771	0.5394 d.f. = 44
10	$250 thousand–$1 million	− 0.0010 (0.0015)	0.0005 (0.0016)	− 0.0008 (0.0018)	0.0044 (0.0010)	− 0.0036 (0.0023)				5.4059	0.4029 d.f. = 44
11	$1 thousand–$1 million	0.0017 (0.0017)		− 0.0083 (0.0036)	0.0056 (0.0010)	− 0.0048 (0.0025)	0.0934 (0.0791)			5.6427	0.5940 d.f. = 43
12	$1 thousand–$1 million	0.0020 (0.0017)		− 0.0140 (0.0051)	0.0055 (0.0010)	− 0.0060 (0.0025)		− 0.0942 (0.0736)	0.0530 (0.0779)	5.8559	0.6163 d.f. = 42

[a] b_3 is given only when it differs from b_2 in a manner of some interest. Durbin-Watson coefficients, although not reported, were calculated by ordering the observations by X_2. All coefficients are significant either at the 1 per cent level of significance or fall into the indeterminate region.

The equations indicate that loan rates tend to be higher where concentration is greatest (in 1955 but not in 1957) [3] and where the de-

[2] United States Department of Labor, Employment Security Bureau, *BES. No. R–174: Area Manpower Guidebook; 174 Metropolitan Labor Market Areas* (1957).

[3] The reason for this difference in the effect of concen-

mand for business loans is greatest (as measured by the percentage increase in manufacturing employment). Loan rates also tend to be lower where the average size of loan is greatest (indicating lower costs) and where a larger percentage of loans have maturities of under a year.

In equation 1 (1955), the relative importance of each regression coefficient in explaining loan rates is roughly identical, but in equation 7 (1957) the demand variable (X_5) has by far the greatest importance. The absolute importance of the concentration variables, however, is rather small. Equation 1 indicates that a ten per cent increase in concentration will, on the average, increase loan rates by only six basis points. Or if concentration were to increase by sixty per cent, which is approximately the range of concentration values among the forty-nine metropolitan areas, loan rates would increase by only 36 basis points.[4] The question is whether this small difference in loan rates might not be accounted for by further differences in costs, loan conditions, etc., inadvertently excluded from the estimating equations.

The regressions on different sizes of borrower indicate that as the size of borrower increases, the effect of concentration on loan rates diminishes. For example, in the class \$1–50 thousand (1955), a twenty per cent increase in concentration raises loan rates, on the average, by 36 basis points. In the size class \$50–250 thousand, the same increase in concentration raises rates by only 14 basis points. This pattern is also present in 1957, although these estimates are not as reliable as those for 1955.

In both years, the poorest coefficients of multiple correlation are found in the smallest size class. In this class the average size of loan (X_4) is the only significant variable (at the 1 per cent level) in both years. In 1955, concentration is also significant. Since very small borrowers are limited to local markets, market structure is likely to be important in determining loan rates. If inferences can be made from the above equations, loan rates to small borrowers appear to be more the result of bank costs and market structure than of general credit conditions, such as the demand for loans.

The best coefficients of multiple correlation are in the size class \$50–250 thousand. Borrowers in this class are not so limited that banks can completely ignore general credit conditions. In both years, demand (X_5) is significant. These borrowers, however, may not be willing to go often to distant banks so that local banks may possess market power (X_2 is significant at the 1 per cent level) and be able to discriminate to some extent against them.

For borrowers in the size class \$250 thousand to \$1 million, market power is less important than for either of the smaller classes. These borrowers are probably large enough to go, without too much inconvenience or additional cost, to distant lenders if local banks discriminate against them. Loan rates which banks charge these borrowers are more reflective of general market conditions (X_5) and the peculiarities of individual loans (X_6). Regression estimates by size of borrower, then, show almost exactly what "conventional economic wisdom" would predict. Market structure is more important in small borrower markets than in large borrower markets, and general market conditions are most important in large borrower markets and in periods of "tight" money, such as 1957.

Equations 5, 6, 11, and 12 test for the effect on loan rates of bank organization and size of SMA. No significant effect can be discerned. Given the level of concentration, it appears to matter very little whether an SMA is a unit or branch banking area or whether it is large or small. The size of city, of course, is directly related to the number of banks in the area. Although not reported above, variables representing the number of banks in each SMA and the population per bank in each SMA were also found not to be significant.

Hypothesis II — Flexibility of Loan Rates

The second hypothesis states that, *ceteris paribus*, loan rates are less flexible in markets with high concentration than in markets with

tration between 1955 and 1957 is discussed later. It is argued that more credibility should be attached to the estimates for 1955.

[4] An increase in loan rates of 36 basis points, however, constitutes 27.5 per cent of the range of rates in 1955 (range of 1.3 per cent) and is a rise of 7.3 per cent in the average rate in 1955 (4.94 per cent). In the long run, many businessmen may feel very strongly about a seven per cent rise in borrowing costs. The method by which concentration is measured may also affect the above results.

low concentration. Flexibility is measured by the absolute change in loan rates during a fixed time period. When testing the first hypothesis, it is recalled, differences were found between estimates in 1955 and those in 1957. Market structure, or concentration, is significant in 1955 but not in 1957. This difference can be partially explained by loan rate movements between 1955 and 1957.

Before turning specifically to testing the second hypothesis, it is useful to discuss briefly the particular dates of the loan surveys, October 4, 1955, and October 16, 1957. The Federal Reserve's series "Bank Rates on Short-Term Business Loans" shows that the prime rate was approximately constant from early in 1954 until August 5, 1955, when it increased a quarter per cent. This rise was the only change immediately preceding the 1955 survey. Moreover, rates on loans from $1 thousand to $10 thousand varied by only six basis points for approximately fifteen months preceding the survey. In sum, a good case can be made that loan rates were on a kind of "plateau" or at "equilibrium" during the period previous to the 1955 survey.

This argument cannot be made for the period preceding the 1957 Survey. Although loan rates reached their peak by October 16, 1957, there was a steady rise from the third quarter of 1955 to the last quarter of 1957. The loan rate series on loans of $1–10 thousand shows that the range of rates during the year preceding the 1957 survey was 41 basis points as compared to a range of six basis points before the 1955 survey. This difference in rate stability is especially important because sampled banks calculated effective interest rates on the basis of the *original* amounts of loans outstanding on the date of each survey.

Testing Loan Rate Flexibility

Changes in loan rates from October 1955 to October 1957 are inversely related to levels of concentration. For the forty-nine metropolitan areas investigated, the following regression equation is estimated for borrowers with assets of $1 thousand to $1 million.

$$X_9 = 0.5205 - \underset{(0.0015)}{0.0049X_2} - \underset{(0.0043)}{0.0036X_4} + \underset{(0.0009)}{0.0021X_5} + \underset{(0.0021)}{0.0046X_6}$$

$R^2 = 0.3366$

d.f. = 44

Where: X_2 = percentage of deposits held by the largest three banks (low ratio);
X_4 = percentage change in average size of loan;
X_5 = percentage change in manufacturing employment from 1950 to 1955;
X_6 = percentage of total loans with maturities of under a year, 1955;
X_9 = change in interest rates, 1955–1957.

On the average, an increase of ten per cent in concentration is associated with a change in loan rates smaller by five basis points; or a 60 per cent increase in concentration is associated with a change in loan rates smaller by about 30 basis points. Since the average change in loan rates between 1955 and 1957 is only approximately 54 basis points, the effect of concentration appears worthy of some attention. As in previous equations, the type of bank organization and the size of an SMA do not have a significant effect on loan rate changes.

There is also more evidence to indicate that concentration does have an effect on loan rate flexibility. Several changes in loan rates taken from the Federal Reserve's series "Bank Rates on Short-Term Business Loans" are correlated with concentration. The simple correlation coefficients between loan rate changes and concentration for the seventeen cities included in both this study and the Federal Reserve's series are as follows.[5]

Variables	r
Interest rate changes from June 1958 to March 1959	
I_1	−0.6428
I_2	−0.4814
Interest rate changes from June 1958 to March 1960	
I_1	−0.6218
I_2	−0.6327

Where: I_1 = interest rate on business loans of $1–10 thousand;
I_2 = interest rate on business loans of $10–100 thousand.

Three of the simple correlation coefficients

[5] The concentration values used here are taken from the Federal Deposit Insurance Corporation, *Annual Report* (1960), 102–103. These values are used because this analysis is concerned with loan rate changes from 1958–1960 and because independent estimates of concentration provide a better test.

are significant at the 1 per cent level and one at the 5 per cent level. All indicate an inverse relationship. These particular dates are used because June 1958 was at the trough of the interest rate cycle; March 1959 was at approximately the middle of the upswing; and March 1960 was at the peak of the cycle. This evidence appears to substantiate, then, the hypothesis that loan rates are less flexible in markets with high concentration than in markets with low concentration.[6]

The inverse relationship between concentration and loan rate flexibility, it is recalled, was cited as a possible explanation for the differing significance of concentration in 1955 and 1957. It seems reasonable to believe that from 1955 to 1957 loan rates increased by more in markets with low concentration than in markets with high concentration, reducing the differences observed in 1955. More specifically, analyses based on data from the 1955 and 1957 Surveys, both taken during the cyclical upswing, are likely to underestimate the effect of concentration on loan rates because of differences in "rate sensitivity" or in "lag structure." The loan rate stability which occurred before the 1955 survey tends to give more credibility to the estimates for 1955 than to those for 1957.

There are two other plausible explanations for the difference between estimates of the effect of concentration in 1955 and 1957. The first is the "ceiling" theory. The second is the "quantity rationing" theory. The ceiling theory states that there exists an interest rate ceiling on loans to small borrowers such that small loan rates cannot exceed a certain upper limit. If the ceiling theory were correct, loan rates which are high would rise by less than would low rates. The higher loan rates are nearer to the permissible maximum. It was shown that the highest rates (in 1955) are in markets with high concentration. The ceiling theory, then, might explain why markets with high concentration have relatively small increases in loan rates.

Testing for the existence of a "ceiling" is difficult. Rate changes from 1955 to 1957 are negatively correlated with levels of loan rates in 1955. The simple coefficients of correlation are –0.4501 for all metropolitan areas and –0.6164 when the eleven branch observations are excluded. Moreover, any correlation between rate changes and levels of rates automatically includes the effect of concentration on rate changes, since concentration is one of the determinants of loan rate levels. Lastly, the ceiling theory implies that the variance of the interest rates should be less in 1957 than in 1955. The variance is 0.1040 per cent in 1955 and 0.0892 per cent in 1957, a difference of only 0.0148 per cent. Thus, although the evidence hints at the existence of a "rate ceiling," it is far from conclusive.

The second explanation, the "quantity rationing" theory, states that, in markets with high concentration, smaller borrowers are discriminated against in terms of the "availability of credit." The loan rate used in this study is a weighted average over three size classes of borrowers, $1–50 thousand, $50–250 thousand, and $250 thousand to $1 million. It is possible, of course, for this rate to change between 1955 and 1957 solely as a result of changes in the weights. For example, since large borrowers pay lower rates, if banks in markets with high concentration made a larger proportion of their loans to large borrowers in 1957 than in 1955, while the loan distribution remained the same for banks in markets with low concentration, a *weighted* loan rate would show smaller changes between 1955 and 1957 for markets with high concentration than for markets with low concentration. In other words, when credit is tight, banks with market power may ration very small borrowers and place more loans with larger borrowers who are better credit risks.

A possible test of the quantity rationing theory is to estimate similar equations to those estimated earlier but use *unweighted* variables, in particular, an *unweighted* interest rate. This procedure gives the same weight to the size class $1–50 thousand as to the class $250 thousand–$1 million, which means that if a greater proportion of loans was made to large borrowers

[6] This is also true when loan rates are falling. For example, on August 23, 1960, the prime rate decreased by a half per cent, from 5 per cent to 4.5 per cent. For the seventeen cities included in both the Federal Reserve's series and in this study, and for the period June 1960 to September 1960, the average change in rates on loans of $1 thousand to $10 thousand was approximately −8.5 basis points. The average level of concentration for cities which had rate changes (in absolute values) greater than the average change is 63 per cent, while for those cities which had smaller changes it is 75 per cent.

in 1957, it would not affect average loan rates. The estimates are almost identical to those obtained from the regressions using weighted variables.[7] Thus, there is little reason to believe that credit discrimination is the cause of the differing estimates of the significance of concentration between 1955 and 1957.

Conclusions

The foregoing results suggest that there exists in banking markets some relationship between market structure and market performance, high concentration being associated with less competitive price behavior. Some possible inferences from the foregoing analysis are:

(1) concentration in banking markets should not be permitted to increase because of its adverse effect on price competition;

(2) the absolute effect on loan rates of an increase in concentration is likely to be small, although the quantitative effect necessarily depends on the statistic used to measure concentration;

(3) the metropolitan area appears to be a "workable" market definition for borrowers with less than $1 million in assets. Even within this size class, however, the market may become less appropriate as the size of borrower increases;

(4) measuring concentration by using total deposits suggests that bankers' behavior in "commodity markets" may be influenced to a large extent by their position in the "deposit market";

(5) given the level of concentration, the type of banking (branch or unit) has little effect on market performance;

(6) given the level of concentration, the size of city, which indirectly accounts for the varying numbers of banks in each market, has little effect on market performance;

(7) since high concentration is associated with rigid price behavior, a more concentrated banking structure would make more difficult certain monetary policy objectives; and

(8) since increasing concentration would probably raise rates charged small borrowers by more in relation to rates charged large borrowers, the result might be a discriminatory reallocation of funds from small to large borrowers.

[7] An analysis was also done to determine if concentration had any systematic effect on the percentage of total loans in each area going to different size borrowers. For both 1955 and 1957 no significant relationship was found. There was also no significant relationship between loan distribution and form of bank organization, branch or unit.