

CHANGES IN BANKING CONCENTRATION IN SELECTED FIFTH DISTRICT SMSAs: 1970-1976

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The expansion in the bank consolidation movement that began in the 1960's and gained speed in the early 1970's raised concern over possible over-concentration in banking markets. Have these fears been realized? This article will seek a partial answer to this question by examining changes in concentration that have occurred since 1970 within selected Fifth District metropolitan areas.¹

Court decisions and regulatory rulings on bank mergers and bank holding company acquisitions have relied heavily on measures of bank concentration. These measures have been employed as indicators of potential anti-competitive effects of proposed bank consolidations.² Salley, however, cautions against the simplistic acceptance of concentration ratios as a quantitative measure of anti-competitive effects: "The concentration ratio can only suggest that the fewness of large firms makes restrictive pricing and output decisions more possible than if there were many firms of equal size. It does not mean that the large firms are actually engaging in anti-competitive conduct" [10, p. 187].

Empirical investigations into the relationship between concentration and prices in banking markets have produced conflicting results. Though most studies generally show that higher concentration is associated with higher prices and a deterioration in other performance variables, the effect is small [e.g., 6, 7, 8, 12]. Relatively large changes in concentration are associated with relatively small changes in performance. No such relationship, however, was found

in a recent study in Texas [3]. These opposing results may be partially explained by sampling differences and measurement problems. One problem, for example, is the difficulty of defining product and geographic bank markets. Because of such limitations, no attempt will be made in this article to draw conclusions about changes in competition on the basis of changes in statistical measures of concentration.

The article proceeds as follows. The first section introduces and briefly describes the measures of concentration included in the analysis. The second section applies these measures to selected Fifth District markets and summarizes the results.

Measuring Static Market Concentration Studies of market structure have frequently focused upon static measures that deal with the domination of a few firms at a single point in time. The three-bank concentration ratio, for one, determines the percentage of total deposits in a market held in aggregate by the three largest banks. It may be computed by the

formula $CR = \sum_{i=1}^3 S_i$. Here CR is the concentration

ratio, S_i is the i^{th} bank's share (percent of total) of market deposits, \sum is the summation operator, and i is the summation index representing each of the three largest firms. In words, the formula states that the concentration ratio is the sum of the deposit shares of the three largest banks. Note that this measure places total importance on the largest banks by implying that they are the only relevant firms to consider when gauging the degree of monopoly power that exists in a market. The concentration ratio does not distinguish between alternative distributions or mixes of market shares between even these largest banks. The same result would be derived from markets A or B if the three largest banks in each controlled 55, 10, 10 and 25, 25, 25 percent, respectively. Each market would have a three-bank concentration ratio of .75, yet the implications for monopoly power would be quite different in the two

¹ Only urban markets were considered in this article since the dual purpose of banking regulation tends to confine the potential usefulness of concentration ratios to the larger banking markets [10]. The use of Standard Metropolitan Statistical Areas (SMSAs) should not be interpreted as meaning the Federal Reserve Bank of Richmond or the Federal Reserve System has determined that the SMSA delineation best approximates the banking markets included in the study.

² Two landmark cases are *U. S. v. Philadelphia National Bank, et al* (1962) and *U. S. v. The Phillipsburg National Bank and Trust Co.* (1969). In the latter case, the Supreme Court ruled that concentration ratios were the only way by which the probable anti-competitive effects of a proposal could be ascertained, and without concentration ratios, no statistically reliable probability of lessening of competition could be determined. This reasoning has come under heavy criticism, for example [1, 2, 11].

markets. Note also that the concentration ratio takes no account of the number of firms in a market or the distribution of the remaining shares among small firms.

A better measure of static market structure would consider both the total number of firms in a market and the variation among the sizes of firms, two structural features that bear on the ability of the larger firms to increase price with a minimum loss in market share. The Herfindahl Index (HI) incorporates

these features. It may be defined as
$$HI = \sum_{i=1}^n S_i^2$$

where n is the number of banks represented in the market and S_i is the i^{th} firm's market share expressed as a percent of total deposits.³ In words, the formula states that the Herfindahl Index is the sum of the squares of the deposit shares of all banks in the market. Since each market share is squared prior to summation, relatively greater weight is given to banks with larger market shares. This seems reasonable since it is these firms that presumably have the power to alter short-run prices. Any switch in market shares from one firm to a larger firm will result in a larger value in the Herfindahl Index. Similarly, following a loss in market share by one bank to a smaller bank, the Herfindahl will fall. This measure can assume values between zero (indicating an infinite number of firms in the market) and one (indicating only one firm present).

Measuring Dynamic Market Concentration In judging the intensity of competition in a market, some measure of the ability of leading firms to maintain their relative market position over time may be more significant than is the extent of concentration at a particular point in time [4]. Consequently, a complete description of a market not only should include its current status but also an indication of how its structure has changed over time. Measures of change in market concentration can provide important information on market structure. Previous studies have relied on the Dynamic Herfindahl Index, the Dynamic Concentration Ratio, and/or the Share Stability Index for information concerning the changing structure of individual banking markets [3, 5, 10]. These measures were also applied to the metropolitan areas included in this article.

The Dynamic Herfindahl Index (DHI) is simply

³ An alternative definition of the Herfindahl Index is:

$$HI = \sum_{i=1}^n x_i^2 + \frac{1}{n}$$

where n is the number of firms in the market and x_i is the deviation of the i^{th} firm's market share from the average share ($x_i = S_i - \bar{S}$). The index increases, then, with either greater variation in the sizes of the firms or with a smaller number of firms.

the change in the value of the Herfindahl Index between years as measured by the difference between the end- and beginning-year index numbers, i.e., $DHI = HI_{1976} - HI_{1970}$. It indicates the change in concentration or degree of inequality of firms' market shares. Since the Herfindahl gives greatest weight to the larger firms, the DHI gives an indication of whether the market power of the largest firms increased or decreased over the intervening years. The DHI can be either positive or negative. If positive, it suggests the largest firms have increased their relative strength in the market since the base year. If negative, on the other hand, the degree of inequality among market shares has declined.

The Dynamic Concentration Index (DCI) measures the statistical relationship between the 1970 market share of each bank and its 1976 share through simple regression analysis. Specifically, the DCI is defined as the *geometric mean* of (1) the regression of 1976 market shares on 1970 shares and (2) the reciprocal of the regression of 1970 on 1976 shares.⁴ The DCI attains relevance when its computed value is compared with a norm or standard of unity. A value of 1.0 means that the relative sizes of the firms in a market are the same as in the base year, indicating that no change in concentration has occurred. A DCI greater than one indicates the larger firms have grown faster than (or, at the expense of) the smaller firms and, therefore, that concentration has increased. Conversely, a DCI less than one signifies that concentration has decreased since the largest banks have grown at a slower pace than the smaller banks. A DCI value below unity indicates that, on average, the larger firms in the base year were not able to maintain their market shares and suggests a lack of monopoly power in a market [5].

Another measure of change in market structure is the Share Stability Index (SSI). It is the simple correlation coefficient between market shares for each firm in the two years and, therefore, indicates the degree to which the market share of each firm in 1976 is determined by its 1970 share. The SSI has been used as a measure of the stability of market shares and, indirectly, as a measure of the intensity of competition in each market [3]. The assumption is that the greater the competition between firms in a market, the more susceptible will each firm be to variations in market share. Conversely, the less stable

⁴ The DCI is the geometric mean of the regression coefficients, b_1 and b_2 , where $b_1 = \Sigma xy / \Sigma x^2$, $b_2 = \Sigma y^2 / \Sigma xy$, x is the deviation of the firm's market share from the average share in 1970, and y is the deviation from the average share in 1976. The DCI, therefore, is the square root of the product of the regression coefficients, i.e., $DCI = \sqrt{b_1 b_2}$. As discussed in Prais [9], it is necessary to follow this procedure to obtain an unambiguous estimate of the direction of change in market concentration.

are market shares (the lower the SSI value), the greater the presumed degree of competition in a market. A SSI equal to one indicates no change in market shares, while a SSI equal to zero indicates no relationship at all between firms' market shares in 1970 and 1976.

Changes in Fifth District Metropolitan Areas

The preceding section defined and explained the logic of alternative measures of market concentration. The next step is to apply the measures to 1970 and 1976 bank deposit data. Before this could be done, however, it was necessary to make certain adjustments for bank entry, mergers, and holding company acquisitions. The adjustments were as follows: a new bank entering the market between 1970 and 1976 was treated as if it had existed in the market in 1970 with a market share of zero. Similarly, a bank merged or acquired by another banking organization already in the market was treated as if it remained in the market in 1976 with a zero market share. A bank acquired by an outside firm, i.e., one not in the market, was simply replaced by that firm. Market shares were calculated by banking organization rather than by individual bank. Shares of affiliated banks,

therefore, were combined under the control of the parent holding company. Since adjustments were made in the geographic boundaries of SMSAs during the interim, market shares for both years were calculated using 1976 SMSA definitions.

According to the accompanying table, most of the largest SMSAs in the Fifth Federal Reserve District experienced *declines* in concentration between 1970 and 1976. The table shows the Dynamic Herfindahl Index declined in 11 of the 13 areas examined. Only the Charlotte-Gastonia and Baltimore SMSAs exhibited slight increases in this measure of concentration. The largest absolute declines occurred in the three South Carolina SMSAs; in Greensboro—Winston-Salem—High Point; and in Charleston, West Virginia, with the latter and Greenville-Spartanburg declining sharply from relatively low concentration levels in 1970. The Washington SMSA, with nearly twice the total deposits and banking organizations as the next largest market, displayed the least concentration in both years. The percentage reduction in concentration in the nation's capital over the period was considerable. The Charlotte-Gastonia and Roanoke metropolitan areas had the highest Herfindahl Indexes in 1976.

DYNAMIC MEASURES OF MARKET STRUCTURE

SMSA ¹	Herfindahl Index		Dynamic Herfindahl Index ²	Dynamic Concentration Index ³	Share Stability Index
	1970	1976			
Charleston-North Charleston, S. C.	0.2546	0.2161	-0.0385	0.8746	0.9862
Greenville-Spartanburg, S. C.	0.1590	0.1191	-0.0399	0.7837	0.9727
Columbia, S. C.	0.2071	0.1538	-0.0533	0.7686	0.9645
Greensboro—Winston-Salem— High Point, N. C.	0.2820	0.2290	-0.0530	0.8864	0.9957
Raleigh-Durham, N. C.	0.1919	0.1729	-0.0190	0.9278	0.9879
Charlotte-Gastonia, N. C.	0.2385	0.2458	0.0073	1.0189	0.9754
Newport News-Hampton, Va.	0.1633	0.1628	-0.0005	0.9974	0.9795
Norfolk-Virginia Beach- Portsmouth, Va.-N. C.	0.2266	0.2004	-0.0262	0.9204	0.9858
Richmond, Va.	0.1889	0.1751	-0.0138	0.9509	0.9892
Roanoke, Va.	0.2418	0.2376	-0.0042	0.9880	0.9778
Charleston, W. Va.	0.1547	0.1168	-0.0379	0.8118	0.9804
Baltimore, Md.	0.1649	0.1783	0.0134	1.0464	0.9846
Washington, D. C.-Md.-Va.	0.0812	0.0686	-0.0126	0.9029	0.9853

¹ 1976 SMSA definitions formed the basis for calculation of market shares in both 1970 and 1976. For areas included within SMSAs, see *Fifth District Figures*, Federal Reserve Bank of Richmond, 1976, p. 109.

² Negative values indicate decreases in concentration.

³ Values less than 1.0 indicate decreases in concentration.

All markets except Charlotte-Gastonia and Baltimore also exhibited Dynamic Concentration Indexes below 1.0, indicating that, on average, the largest firms have lost influence or dominance in their respective markets since 1970. Both the DCI and the DHI identified the same SMSAs as experiencing the greatest reduction in concentration. The Columbia, S. C. SMSA again had the greatest reduction, as measured by the DCI, with a value of .7686. This index reveals that the larger-than-average sized banks in the Columbia SMSA lost, on average, approximately 23 percent of their respective market shares between 1970 and 1976. Only slightly smaller losses were experienced by the large banks in Greenville-Spartanburg, both Charlestons, and Greensboro—Winston-Salem—High Point. The larger-than-average banks in Charlotte-Gastonia and Baltimore, on the other hand, increased their market shares an average of 1.89 and 4.64 percent, respectively.

The Share Stability Index for each market shows a strong relationship between market shares across years. Since the SSI was only slightly lower than 1.0 for all markets, market shares appear to be very stable and, though moving in favor of smaller banks in the aggregate, have not been subject to wide variations. The combination of high SSIs and low DCIs suggests that the larger-than-average banks lost market shares as a group primarily to small or new banks in the market rather than to other large banks.⁵ This clearly was the case in the South Carolina markets; in Greensboro—Winston-Salem—High Point and in Charleston, West Virginia. In the remaining markets that experienced declines in concentration, the largest banks appear to have lost market shares both to other large banks and to small banks.

Evidence of decreasing concentration in the majority of markets does not necessarily mean lower prices or an improvement in service to bank customers. Similarly, though the DHI and DCI may indicate changes in monopoly power in the Charlotte-Gastonia and Baltimore SMSAs, higher prices and a deterioration in customer service is not necessarily implied.

Summary Courts and regulatory agencies have been concerned that bank consolidations might increase market concentration and erode competition within individual markets. It does not appear, however, that concentration has increased in Fifth District metropolitan markets. In fact, concentration

measures reported here indicate that 11 of the 13 SMSAs examined actually experienced *declines* in concentration over the 1970-1976 period. On the basis of these findings, it is safe to conclude that the pattern of proposed acquisitions and mergers approved by the Federal banking agencies since 1970, in general, has not resulted in increasing concentration in the District's major urban markets.

References

1. Austin, D. "The Line of Commerce and the Relevant Geographic Market in Banking: What Fifteen Years of Trials and Tribulations Has Taught Us and Not Taught Us About the Measurement of Banking Structure," *Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1977.
2. Fraser, D. and Rose, P. "Banking Structure and Performance in Isolated Markets: The Implications for Public Policy," *Antitrust Bulletin*, (Fall 1972).
3. ———. "Static and Dynamic Measures of Market Structure and the Performance of Commercial Banks," *Journal of Economics and Business*, (Winter 1976), pp. 79-87.
4. Gort, M. "Analysis of Stability and Change in Market Shares," *Journal of Political Economy*, (February 1963), pp. 51-63.
5. Grossack, I. "Towards an Integration of Static and Dynamic Measures of Industry Concentration," *The Review of Economics and Statistics*, (August 1965), pp. 301-08.
6. Heggstad, A. and Mingo, J. "Prices, Nonprices, and Concentration in Selected Banking Markets," *Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago, 1974, pp. 69-95.
7. Kaufman, G. "Bank Market Structure and Performance: The Evidence From Iowa," *Southern Economic Journal*, (April 1966), pp. 429-39.
8. Phillips, A. "Evidence on Concentration in Banking Markets and Interest Rates," *Federal Reserve Bulletin*, (June 1967), pp. 916-26.
9. Prais, S. "The Statistical Conditions for a Change in Concentration," *Review of Economics and Statistics*, (August 1958), pp. 268-72.
10. Salley, C. "Concentration in Banking: Regulatory Numerology or Useful Merger Guideline?" *Monthly Review*, Federal Reserve Bank of Atlanta, (November 1972), pp. 186-93.
11. Stolz, R. "Philadelphia National Bank Case Revisited," *Ninth District Quarterly*, Federal Reserve Bank of Minneapolis, (Winter 1977), pp. 5-11.
12. Yeats, A. "Further Evidence of the Structure-Performance Relation in Banking," *Journal of Economics and Business*, (Winter 1974), pp. 95-100.

⁵ For a mathematical presentation of the implications from combinations of different measures of dynamic concentration, see [5].