WORKING PAPER SERIES

Arie Melnik, Oz Shy and Rune Stenbacka

RELATIVE MARKET SHARE, LEADERSHIP AND COMPETITION IN CONCENTRATED BANKING MARKETS

Relative Market Share, Leadership and Competition in Concentrated Banking Markets

by

Arie Melnik[*]
University of Haifa
And ICER, Torino

Oz Shy[**]
University of Haifa
and WZB, Berlin

Rune Stenbacka[***]
Swedish School of Economics Helsinki and HECER

June 2005

Abstract.
For many years IO economists devoted attention to the size distributions' of firms in a given industry. Most studies showed that the size distribution of firms in oligopolistic markets is highly skewed. There are many small firms and a few large firms. There is also a consensus that relative market shares are important and that large firms are, in general, more profitable and durable than small firms. Relative size is also important as a determinant of the structure of the industry. The concept is also central in strategic analysis of business firms and in the formulation of government (regulatory) policy.

In this paper we propose to use an empirical measure of market leadership. The measure relies on the assumption that the degree of competition critically depends on how dominant the leading firm is in a given industry. The measure also takes into account the number of "significant" competitors in the market and how close they are to the leading firm in terms of size. The measure is simple to use and easy to interpret. It also yields a critical value that facilitates comparisons between different markets.

[*] ICER, Villa Gualino, Viale Settimio Severo 63, 10133 Torino, Italy. Email: amelnik@econ.haifa.ac.il
[**] WZB, Social Science Research Ctr, Reichpietschufer 50, D-10785 Berlin, Germany. Email: ozshyMail@gmail.com.
[***] Swedish School of Economics, POBox 479, 00101 Helsinki, Finland. Email: rune.stenbacka@hanken.fi

Relative Market Share, Leadership and Competition in Concentrated Banking Markets

Section 1: Introduction.

The consolidation of industries by mergers and acquisitions may occur for various reasons. Firms may merge because they wish to take advantage of economies of scale or economies of scope, in order to reduce costs. Sometimes they merge because the managers of the acquiring firm think that running a larger firm would increase their own pecuniary or psychological compensation. Alternatively, a firm may merge with another firm in the same industry because the merged firms expect to increase profits through the reduction of competition, that results from increasing concentration.

According to the argument of "Structure-Conduct-Performance Hypothesis" (SCP), in the theory of industrial organization, highly concentrated markets are less competitive than markets in which many small firms operate. Firms in less competitive markets are expected to pay less for their inputs and sell their outputs at a higher price, thus enjoying higher profits. Following the SCP hypothesis, regulators, in many countries, when evaluating merger proposals, focus on market concentration measures. If concentration reaches high enough level, the presumption is that competition would decrease. Note, that concentration is a market-wide measure and may not consider the relative size of the merging firms.

For the purpose of regulation of proposed mergers, it is believed that competition is reduced due to seller concentration. This is particularly important in markets that were concentrated before the merger under scrutiny is about to take place. Therefore, it appears that anti-trust enforcement focuses on markets that exhibit high levels of concentration, but not on markets with low levels of concentration. In most cases the change in concentration due to a proposed merger is of concern (Rhoades, 2000; Pilloff and Rhoades, 2002).

In this paper we propose an empirical leadership measure which takes into account primarily the economic weight of the leading firm. Our dominance measure is

1

based on the difference between the leading firm and the second largest firm. It also takes into account the combined size of the other (non-bidding) firms. We focus primarily on the banking industry, but the measure has a general value. In the next section we review the current practice of antitrust approach by regulators in the USA. In the following section a detailed review of the literature on the measurement of the structure of banking markets is provided. This is followed by a section which describes our proposed dominance measure. Section 5 demonstrates how the measure might be used for empirical research and section 6 provides a brief summary.

Section 2: Current Practice of Antitrust Analysis: The Case of the Banking Industry.

Bank regulatory agencies and the US department of justice routinely scrutinize bank mergers and acquisitions for potential antitrust violations. To perform the economic analysis, federal and state regulators make assumptions about the geographic limits of banking markets, the nature of the service that the banks provide and the type of competitors in the chosen geographic area. The market area is often defined as a metropolitan areas and the assumption is that the relevant competitors are banks that have offices and branches at the same market area.

Anti-trust analysis of bank mergers follows the guidelines of the US Supreme Court. The court defined the "Line of Commerce" for banking to be a basket of products such as various deposits and various types of credits that banks provide to their customers. To define the relevant geographical market, the Court focused on cases where "The effect of a merger on competition would be direct and immediate". This, in turn, occurs in limited geographical communities, because that's where bank customers typically conduct most of their banking transactions.

According to Schull (1996), these two definitions, the cluster of products and the definition of local geographical markets, have guided banking antitrust analysis since the 1963 ruling. The regulator has to identify the relevant products and services and then defines the boundaries of the local market. Based on this, it is supposed to decide if the merger is likely to "lessen competition". Such a decision relies on the structure of the relevant market (in practice, market concentration), the market shares of individual firms and the number of actual and potential competitors. So banking antitrust policy assumes that market concentration is a reliable indicator of whether a proposed measure will reduce competition significantly. Thus, a proposed merger that increases market concentration, may not be approved.

The department of justice (DOJ) issued periodical guidelines that explain the circumstances under which an application of merger might exceed its "antitrust standards", and therefore, merits close scrutiny. The federal banking regulators follow

these guidelines. The DOJ's guidelines also prescribe levels of concentration and changes in such levels. The most common measure is the HHI index. It is calculated by squaring each bank's share of deposits in a market and then summing these squared shares. The index number used is calibrated to range between zero (perfect competition) and 10,000 (a complete monopoly). The HHI is preferred over simple four-firm concentration ratio, because it gives a greater weight to firms with larger market shares.

According to the guidelines (DOJ and FTC, 1997), a market is not concentrated if HHI <1000 points. It is moderately concentrated if   1000<HHI<1800, and highly concentrated if HHI>1800. These critical points apply to all industries in the US, including banking. Banking, however, gets a somewhat favorable treatment: The DOJ will <u>not</u> challenge a bank merger unless it raises HHI by at least 80 points and the post-merger HHI is at least 1800 points. For other industries, an increase of 50 points in a highly concentrated market, might trigger a legal challenge. According to Cyrnak (1998), the reason for the benevolent treatment of banks is the competition they face from savings and loans associations, savings banks and credit unions.

So, a major step in the procedure involves the determination of changes in HHI and its post-merger level. If the numbers fall outside the range of the DOJ guidelines, it does not necessarily means that a legal challenge would follow automatically. Regulators would have to supplement the numbers with a more detailed analysis before a decision would be made. In this analysis the regulator would consider whether potential competition and market conditions might mitigate the anticompetitive effects of the merger. This analysis would also hint at possible remedies. A candidate for merger can get favorable considerations if it were to agree to divest to a third party some of the branches or offices, such that the remaining ones would fall closer to the guidelines (see Pilloff, (2002) for discussion of divestiture).

Section 3: Review of the Literature.

Following the market structure- conduct-performance (SCP) framework from the economics of industrial organization, a number of studies of bank behavior have used measures of market structure as proxies for market power (see for example, Amel & Liang (1990) and Frame & Kmerschen (1997) and Akhigbe & McNulty, (2003)). According to this framework, there is a positive relationship between general market concentration and firm profitability. The underlying assumption is that high degree of market concentration endows all the firms in that market with significant market power. This, in turn, makes it easier for the firms to collude in order to obtain monopolistic profits.

In general, the literature followed the guidelines of the Department of Justice and focused on two major issues. The <u>first track</u> considered how to define a market and in this context how to measure "performance". The literature there focused on how to measure performance. For example, should performance be measured in the product market (e.g. the price of loans) or in the factor market (e.g. the interest that is offered for deposits). An alternative measure of performance is, of course, the overall profits of the firm involved. The second track of the literature also dealt with the measurement of "structure". Here we briefly review these two strands of the literature.

The process of antitrust analysis relies on several assumptions. Market concentration can be measured only after the market itself has been defined. Therefore, several studies directly tested whether the SCP hypothesis about the definition of local markets holds for the banking industry. Location of banks and their competitors is relevant for this type of analysis. Amel and Starr-McCluer (2002) examine trends in the 1990's to check how and where households obtain their financial services. They found that local institutions provide most of the transaction accounts, but that the tendency to obtain financial services from local banks has declined considerably over time. Similarly, Petrsen and Rajan (2002) using data about small business finance, find that the distances between the lender and the borrowing small business have increased over time. Their results support the notion that wider geographical areas are needed to properly define banking markets for antitrust purposes.

So, are banks with branches in the local market area, the relevant competitors? Cyrnak (1998) investigates this questions. He finds that market concentration of loans to small businesses is significantly lower if the relevant competitors include all banks that lend to small businesses and not just banks that have branches in that local market. Cyrnak and Hannan (1999) evaluate whether the concept of a "cluster" of services is relevant for the pricing of bank's loans. Their measure of bank performance is the interest rate charged on loans to small businesses. They find that the HHI measure based on deposits of banks with branches located in the market area has more power to explain the rates charged on small businesses loans. So, the evidence on the proper definition of market is not conclusive. It turned out that the assumption that banks set each local offices' interest rate according to the concentration in the market area where the branch is located, is not always true. Radecki (1998) finds that banks with offices in several towns offer the same interest at each branch for a specific loan or deposit category. Heitfield (1999) also finds that banks with offices located in several local market areas, charge the same interest rate on the same time of product at each office.

The second branch of the literature considered the "structure" part of the theory. This literature focused on the empirical relations between various measures of market structure on one hand, and on bank profits and prices, on the other. In most of these studies, the common measures of market concentration are the n-firm concentration ratios and/or the Herfindahl-Hirschman index (HHI). Although many studies found positive relations between market concentrations and bank profitability, the results vary considerably. The surveys of Gilbert (1984) and Gilbert and Zaretsky (2003) cite studies that failed to identify clear relationship between market structure and bank performance. A recent case in point is Pillof (1999) who finds that the coefficient on HHI is insignificant. The insignificance in his case is due to the inclusion of another independent variable which measures market size.

As a matter of practice, the structure-conduct-performance framework is not the only empirical theory. Demsetz (1973) and Peltzman (1977) offered an alternative

explanation of the positive association between structure and profits. This approach is called the "efficient structure" hypothesis. In some industries, firm-specific efficiencies lead naturally to concentrated markets. These efficiencies result from innovating technology or access to low-cost factors of production. They enable leading firms to capture large market shares and benefit from higher profits in comparison to less efficient firms. So, concentration results from the operational efficiencies of firms and is not an exogenous characteristic of the market. Smirlock (1985) tests a similar hypothesis on a sample of small US banks during the 1970's. His study shows that once market share is accounted for, the concentration measures do not have explanatory power for bank profitability. By contrast, market share is positively related to bank profitability even after controlling for concentration. Therefore, Smirlock argues that market concentration is not necessarily indicative of collusive market power.

Thus, if some banks in some well-defined markets find a way to lower their cost structure, they can reduce their price slightly. This, in turn, will increase their market share and enable them to become more profitable than high-cost banks. Since the low-cost banks will be larger in size, the observed outcome will show that in highly concentrated markets some banks (but not others) earn higher profits. This point was recently summarized in Carlton and Perloff (2000). It was also mentioned in Berger (1995) who found that the positive relationship between bank profitability and market concentration disappeared when a measure of cost efficiency was added to the estimated regressions.

A natural interpretation of the results of Smirlock (1985) and Berger and Hannan (1989) is that economic rents are gained primarily by the largest firms in concentrated industries. That is, the leading firms enjoy scale economies and hence market share power that causes the distribution of aggregate profits in concentrated industries to be biased in their favor. Simple concentration measures do not measure properly the economic weight of the leading firm.

Section 4: A Definition of Market Share.

The idea that oligopolistic gains may not accrue uniformly across firms in proportion to their market share is now well-documented in many studies. It is acknowledged that the leading firm, in terms of market share, may gain more than a proportional share of profits. The importance of individual firms' market share is also mentioned by Shepherd (1979), Scherer (1980) and Carlton and Perloff (2000). The empirical literature, while using the Herfindahl measure, does not propose any threshold market share that may define market leadership.

We feel that the concept of market leadership is useful in analyzing concentrated markets in which only few firms operate. It should be noted that the HHI is an index for an industry. It is difficult to justify because different structures may be registered as the same in terms of the HHI. For example, consider an industry with four firms, each with 25% market share. The HHI measure is $HHI = 4 \times 25^2 = 2500$. Compare this with another industry where there are five firms. The largest firm controls 40% of the market and the other four firms have a market share of 15% each. In that case, $HHI = 40^2 + 4 \times 15^2 = 2500$. The index is the same for the two industries, even though the market structures are different. Thus, it would be useful to use another index which will define market dominance and be a complement to the HHI. The concept of leadership requires a quantitative bench mark in order to distinguish between concentrated markets with a leading firm and markets where no firm possess any practical degree of market dominance.

The idea that a critical size is important for the definition of leadership reflects the notion that beyond some critical level of market share concentration is likely to affect performance. Below that critical level, there is no dominant firm and hence, competition among few firms can keep prices and profits at reasonable levels. Above that level, a single firm is large enough, relative to other firms, and is able to increase profit margins. We begin by considering the entire range of possible market structures. Complete monopoly on one hand, and perfect competition on the other, are easy to define. We use both to define an intermediate level of concentration that may be

considered relevant. Specifically, we ask how large should the market share of a leading firm be defined, in relations to other firms, in order for it be labeled as "a leading firm"?

In a well-defined industry that produces Q units of output, a given firm, n, produces Q_n units. Its market share is $q_n = Q_n/Q$. Suppose now that firms are ranked by their market share in a descending order. Specifically, we rank the N firms by market share: $q_1 > q_2 > q_3 > \dots > q_N$. If $q_1 = 1$, a complete monopoly exists. Non-dominated oligopoly exists if $q_1 = q_2 = q_3 = \dots = q_n$. If N is very large, complete competition is obtained. We now define a leading firm, in a given industry of N firms as one which possess a market share that is halfway between these two extremes, namely:

$$q_1^* = \tfrac{1}{2}\,(1 + 1/N) \tag{1}$$

Here, q_1^* is the smallest market share that defines a relative leading firm for empirical analysis. Any firm with $q_1 > q_1^*$ is closer to complete monopoly than to a non-concentrated oligopolistic market. The critical dominance value is inversely related to the number of firms and ranges between 0.5 and 0.75.

The critical measure in (1) appears to have the convenient property that it is bounded between 0 and 1. This is the same convenient possessed by the Herfindahl index or by the standard three firms concentration ratio. However, it is different in two respects: first, the number of firms, N, appears explicitly as a determinant of the level of leadership possessed by the leading firm. Second, this is a <u>critical</u> market share that separates markets with a leading firm from markets without a leader.

The critical leadership measure requires one firm to have at least half of the sales of the observed industry in order for it to be defined as a leader. In practice, one may argue that a firm can still be a leader even if it has less than 0.5 of the market. This may happen if other firms in general and the second largest firm in particular, are small by comparison to the leading firm. It is reasonable to expect market dominance to depend not only on the number of firms as in (1), but also on the size of the other firms.

Following this logic, it is appropriate to define a second measure of market leadership. This measure depends on the difference of market shares between the two largest firms. The larger the difference (q1-q2), the more likely it is that market dominance exists even in the absence of q1>q1*. The difference between the two largest market shares is not sufficient. We should also consider the weight of the other firms. Therefore, we define a new measure of this weighted difference.

$$D = (q1 - q2)(1 - \sum_{n=3}^{N} qn) \qquad (2)$$

The expression in (2) implies a second, weaker, definition of market leadership. This is simply the difference between the shares of the two leading firms weighted by the combined share of the two leading firms themselves. Note also that since Σ qn =1 (by definition the sum of all market shares is equal to 1), so , D might also be expressed as

$$D = (q1^2 - q2^2) \qquad (3)$$

Suppose now that there some critical level for the largest firm, q1*. Suppose further that the largest firm is exactly at the critical value of market leadership as defined in equation (1). Specifically, we assume that q1=q1*. Substituting q1* from equation 1 we get

$$D = [1/2 \ (1+1/N) \ ]^2 - q2^2 \qquad (4)$$

Suppose now that the upper bound for q2, when q1 is given, occurs when all the other market shares of firms other than 1 and 2, are minimal. If all the other firms are very small, the share of each must be 1/Q (Q is the number of units sold in the market. In that case, the maximum possible market share of the second largest firm is defines as

$$q2 = 1 - [1/2 \ (1 + 1/N)] - 1/Q \ \Sigma n = 1 - \tfrac{1}{2} \ (1 + 1/N) - [(N - 2) \ /Q \ ] \quad (5)$$

Note that the summation of Σn in the equation sums from three to N. That is, it covers all the firms other than the leader and the second largest firm.

Substituting this upper limit for q2 into equation 4 we get the limiting value for the difference between the two leading firms.

$$D^* = [1/2\ (1+1/N)\ ]^2 - [1-\tfrac{1}{2}\ (1+1/N) - (N-2)\ /Q\ ]^2 \qquad (6)$$

Equation (6) defines a leading firm also for cases in which q1<q1*. That is, it reflects the possibility that a firm would be defined as leader even when its market share is less than half. It may be viewed as a "weak" leadership measure. It obtains when D>D* where D is the actual difference between the shares of the two largest firms. If, on the other hand, D≤D*, the market share of the second largest firm, q2, is sufficiently close to that of the largest firm to prevent it from being defined as a leading firm.

The number of product units sold in the market is also important. If many units are sold, Q is large and the last term in the second brackets of (6) approaches zero, and therefore D* = 1/N. This permits the calculation of a minimal q1 which corresponds to a level of D when q2 is also minimal (i.e. q2 = 1/Q). Since for large quantities 1/Q is very small, we have

$$D = 1/N = q1^2 \quad \text{or alternatively} \quad q1 = \sqrt{1/N} \qquad (7)$$

Note that the last term in equation 7 is the square root of 1 over N. Equation 7 is applicable only when Q is very large (that is, many units of the product are sold), otherwise we should use (6). Note that as the number of firms, N, increases (given Q), the market share needed for leadership declines.

Section 5: Empirical Use.

We have developed a market structure measure which explicitly considers the economic size of the leading firm. There are two measures to consider. The first measure is based on absolute market size. This is the "strong" index defined by equation (1). The second measure is based on the difference of market shares between the two largest firms. This is the "weak" index defined by equation (6). These proposed leadership measures may supplement exiting measures. We turn now to discuss how they may be used.

Some critical values for our market dominance measure are listed in Table 1. The critical values of the "strong" leadership, $q1^*$, are computed from equation (1) above. The second, "weak", leadership index, implies smaller critical values for the leading firm. The critical values are referred as q^* in Table 1 in our calculated from equation (6). In that case, the critical values for $q+$ are calculated for a few different levels of Q (number of units sold in the market).

Table 1: Critical Values for Market Leadership by Number of Firms and Market Size (number of units sold)

N	2	3	4	5	6	7	8	9	10	15	20
q*	0.75	0.667	0.625	0.600	0.583	0.571	0.563	0.556	0.550	0.533	0.525
N	2	3	4	5	6	7	8	9	10	15	20
q+											
50	0.693	0.571	0.508	0.474	0.455	0.446	0.442	0.443	0.445	0.471	0.492
100	0.700	0.574	0.505	0.462	0.434	0.416	0.405	0.398	0.394	0.401	0.423
500	0.706	0.577	0.501	0.450	0.414	0.386	0.365	0.348	0.335	0.297	0.284
1000	0.706	0.577	0.500	0.449	0.411	0.382	0.359	0.341	0.326	0.279	0.256

Footnote to Table 1: values of q1 are calculated from equation (1). Values for q+ are the critical values calculated from equation (6). The numbers, 50, 100, 500, 1000, in the left column are different values of Q (where Q is the number of units sold in the market).*

Table 1 provides a few critical values. Other critical values may be computed for other values of Q and N. For each relevant case, the user may observe the relevant critical value and compare the actual value with it. For example, from equation (1) above, q1* = 0.75 when there are two firms, q1* = 0.667 when there are three firms, q1* = 0.625 when four firms exist, and so on. As for the weak leadership, if the number of units Q = 100 and there are 10 firms, the critical value is 0.394. So if the largest firm has a market share of 0.3, is not dominant. But if it has a market share of 0.4 it is a leading firm in the weak sense because its market share falls above the critical value.

A comparison of actual values to critical values is helpful in two respects. First, it provides additional information to the information that is commonly inferred from using conventional measures such as the three firms' concentration ratio or the Herfindahl index. Our proposed measure can be used as a complement to the existing measures, for example one may use the Herfindahl index to examine concentration in a broad sense and then use the measure of q* or q+ to test whether, within an existing oligopolistic structure, there is a leading firm. Second, for empirical purposes, it is convenient to have a numerical "bench mark" that would help to decide whether to accept or reject market leadership on the basis of an a-priori reasoning.

The proposed measure, q+, may also serve as a substitute to existing market structure measures. That is, it could be used in a structure-conduct-performance studies in the same way as three-firms concentration ratios. For the purpose of empirical research, or even for policy studies, it has the convenience of falling in the zero-one interval just as the other existing measures.

The notion that market leadership depends on the relative size of the two major firms has both an empirical justification and a practical merit. The measure q+ is based on the difference between the first and second firms, because of two practical considerations: First, this is the difference that matters most for the analysis of competition. According to Hax and Majluf (1983), the difference between the two leading firms, or the ratio between the two largest market shares, is the most important strategic variable. A second reason for using q+ as a critical measure, is the availability

of data. Information about the largest firm and its market share is usually more readily available than information on each of the other firms.

Section 6: Summary and Conclusions.

According to the SCP hypothesis, the ability of banks (in a given local market area) to charge high interest rates on loans and/or offer low interest rates on deposits, depends on the structure of the market. Such behavior is assumed to depend on how high is the local market concentration. However, in many practical situations, it is not the industry that matters so much, but rather the relevant size of the leading firm. Over the recent past many economists and policy makers viewed that concentration per se is not the only thing that matters. It is primarily the size asymmetry that hurts competition.

In this paper we proposed a new measure for market structure. This measure focuses on the leading firm and its market share compared with the share of other firms in the industry. This proposed measure can be used as a complement to the existing HHI which refers to the industry rather to the leading firm. The measure makes sense intuitively because it is based on the relative size of the two leading firms within an industry or within a given local market. It has the added advantage of providing critical values for oligopolistic market structures.

References.

Akhigbe, Aigbe and James E. McNulty (2003). "The Profit Efficiency of Small US Commercial Banks", <u>Journal of Banking and Finance</u>, 27(2), pp. 307-325.

Amel, Dean F. and Nellie Liang, 1990. "Dynamics of Market Concentration in US Banking 1966-1986", <u>International Journal of Industrial Organization</u>, 8, pp. 375-384.

Amel, Dean F. and Nellie Liang (1997). "Determinants of Entry and Profits in Local Banking Markets", <u>Review of Industrial Organization</u>, 12, pp. 59-78.

Amel, Dean F. and Starr-McCluer, Martha (2002). "Market Definition in Banking: Recent Evidence", <u>Antitrust Bulletin</u>, 47, pp. 63-89.

Berger, Alan N. (1995). "The Profit-Structure Relationship in Banking – Test of Market-Power and Efficient-Structure Hypotheses", <u>Journal of Money, Credit and Banking</u>, 27, pp. 404-431.

Berger, Alan and Timothy Hannan, (1989). "The Price-Concentration Relationship in Banking", <u>Review of Economics and Statistics</u>, 71, pp, 291-299.

Carlton, Dennis W. and Jeffery M. Peloff (2000). <u>Modern Industrial Organization</u>, (Third Edition), Addison Wesley Longman, Reading Mass.

Cyrnak, Anthony W. (1998) "Bank Merger Policy and the New CRA Data", <u>Federal Reserve Bulletin</u>, 84(9), pp. 703-715.

Cyrnak, Anthony W. and Timothy H. Hannan (1999), "Is the Cluster Still Valid in Defining Banking Markets? Evidence from a New Data Source", <u>Antitrust Bulletin</u>, 44(2), pp. 313-331.

Demsetz, Harold (1973). "Industry Structure, Market Rivalry and Public Policy", <u>Journal of Low and Economics</u>, 16, pp. 1-9.

DOJ, Antitrust Division and The Federal Trade Commission, (1997) <u>Horizontal Merger Guidelines</u>, Department of Justice, Washington DC.

Frame, W. Scott and David R. Kamerschen (1997). "The Profit Structure Relationship in Legally Protected Banking Markets Using Efficiency Measures", <u>Review of Industrial Organization</u>, 12, pp. 9-22.

Gilbert, Alton (1984). "Studies of Bank Market Structure and Competition: A Review and Evaluation", <u>Journal of Money, Credit and Banking</u>, 16, pp. 617-644.

Gilbert, Alton R. and Adam M. Zaretsky (2003). "Banking Antitrust: Are the Assumptions Still Valid?", <u>Federal Reserve Bank of St. Louis Review</u>, 85, pp. 29-52.

Hannan, Timothy H. (1997). "Market Share Inequality: The Number of Competitors and the HHI: An Examination of Bank Pricing", <u>Review of Industrial Organization</u>, 12, pp. 23-35.

Hax, Arnoldo C. and Nicolas S. Majluf (1983). "The use of the Gross-Share Matrix in Strategic Planning", <u>Interfaces</u>, 13, pp. 46-60.

Heitfield, Eric A. (1999) "What do Interest Rate Data Say about the Geography of Retail Banking Markets?", <u>Antitrust Bulletin</u>, 44(2), pp. 333-347.

Peltzman, Samuel (1977). "The Gains and Losses from Industrial Concentration", <u>Journal of Low and Economics</u>, 20, pp. 229-263.

Peterson, Mitchell A. and Raghuram G. Rajan (1995). "The Effect of Credit Market Competition on Lending Relationships", <u>Quarterly Journal of Economics</u>, 110(2), pp. 407-443.

Peterson, Mitchell A. and Raghuram G. Rajan (2002) "Does Distance still Matter? The Information Revolution in Small Business Lending", <u>Journal of Finance</u>, 57(6), pp. 2533-2570.

Pilloff, Steven J. (2002), "An Empirical Analysis of Divestiture in Bank Mergers", Finance and Economics Discussion Papers no. 60, Board of Governors of the FRS, Washington.

Pilloff, Steven J. and Stephen A. Rhoades, (2002). "Structure and Profitability in Banking Markets", <u>Review of Industrial Organization</u>, 20, pp. 81-98.

Radecki, Lawrence J. (1998). "The Expanding Geographic Reach of Retail Banking Markets", <u>Economic Inquiry Review</u>, FRB of New York, 4(2), pp. 15-34.

Radecki, Lawrence J. (2000). "Competition in Shifting Product and Geographic Markets", <u>Antitrust Bulletin</u>, 45(3), pp. 571-613.

Rhoades, Stephen A. (1995). "Market Share in Equality, the HH1 and other Measures of the Firm-Composition of a Market", <u>Review of Industrial Organization</u>, 10(6), pp. 657-674.

Rhoades, Stephen A., (2000). "Bank Mergers and Banking Structure in the US", <u>Staff Study</u>, 174, Board of Governors, FRS, Washington.

Santomero, Anthony M. (1999). "Bank Mergers: What's a Policy Maker to do?", <u>Journal of Banking and Finance</u>, 23, pp. 637-643.

Scherer, Fredrick M. (1980). <u>Industrial Market Stricture and Economic Performance</u>, 2nd edition, Rand McNally, Chicago.

Shepherd, William G. (1979). The Economics of Industrial Organization, Prentice Hall, Englewood Cliffs, NJ.

Shull, Bernard , (1996). "The Origins of Antitrust in Banking: An Historical Perspective", Antitrust Bulletin, 41(2), pp. 255-288.

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