

Banking Antitrust: Are the Assumptions Still Valid?

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The federal bank regulatory agencies and the U.S. Department of Justice (DOJ) scrutinize bank mergers and acquisitions for potential antitrust violations. To perform this antitrust analysis, the federal regulators make assumptions about the geographic scope of banking markets, the types of competitors that banks face in these market areas, and the nature of banking services. The authorities assume that the relevant geographic market is a local area where banks compete to offer financial services to households and small businesses. That market area is often approximated by a metropolitan area for mergers involving banks in urban areas and by a county for those involving banks in rural areas. The antitrust authorities assume that the relevant competitors are banks with offices in the same market area. They further assume that the relevant product for antitrust analysis is a cluster of financial services that is unique to banking. In some analyses, however, the focus is on competition among banks to provide individual categories of deposit and loan services. Antitrust agencies typically use a bank's deposits as the measure of output of financial services each bank provides.

The assumptions that underlie banking antitrust have been subject to criticism in recent years (Austin and Bernard, 2001; Jackson and Eisenbeis, 1997; Moore, 1998; Petersen and Rajan, 2002; Radecki, 1998, 2000; and Santomero, 1999). Some critics focus on assumptions about the relevance of local markets for antitrust analysis. They argue that financial innovation and changes in banking regulations, including nationwide branch banking since 1997, have undermined the relevance of using local areas for competitive analysis. Innovative financial firms are now able to offer services, such as loans and investment options, to customers in areas where the firms do not have offices. In addition, the threat

of entry by out-of-market financial firms constrains the terms under which banks with offices in a given geographic area can offer services to local customers. Finally, studies indicate that banks with offices in many communities tend to offer financial services to all communities on the same terms. The results of these studies appear to undermine the assumption that the terms on which banks make their services available to customers depend to some extent on the structure of local market areas. Shull and Hanweck (2001) also criticize the focus on local markets in banking antitrust analysis, arguing that it is not constraining consolidation of the banking industry at the national level.

Critics also focus on the assumption that a cluster of banking services is the relevant product in antitrust analysis. They argue that the success of nonbank financial firms in providing services to households and small businesses has undermined the premises that commercial banks are the relevant competitors in antitrust analysis and that a bank's relevant product is a "cluster of banking services."¹

The large literature on the topic of banking antitrust dates from the 1960s, when bank mergers in the United States became subject to the federal antitrust statutes. This article, by summarizing the results of empirical studies written or published since the early 1990s, assesses whether these more recent studies provide empirical support for the current assumptions that underlie banking antitrust analysis.²

CURRENT METHOD OF ANTITRUST ANALYSIS IN THE BANKING INDUSTRY

Antitrust analysis of bank mergers and acquisitions dates back to 1963, when the U.S. Supreme Court held that commercial banking, like other

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¹ See DeYoung, Hunter, and Udell (2003) for a description of these changes in the market for financial services to households and small businesses.

² For surveys of the earlier studies, see Rhoades (1982), Gilbert (1984), and Weiss (1989). See Rhoades (1996) for an examination of the implications of empirical studies for the methods of banking antitrust.

industries in the United States, is subject to the Sherman Antitrust Act of 1890 and the Clayton Act of 1914.³ In its opinion, the Court noted that the test for anticompetitive behavior is whether the effect of a bank merger “may be substantially to lessen competition...in any line of commerce in any section of the country.” To apply this test, the Court defined the “line of commerce” for the banking industry as the cluster of products and services—demand deposits, trust administration, and extension of various types of credit, for example—that banks uniquely provide to their customers. In other words, the Court determined that the products and services denoted by the term “commercial banking” compose a distinct line of commerce.

To define “section of the country”—that is, the relevant geographical market—the Court looked to where the effect of a merger on competition would be “direct and immediate.” For banking, this effect occurs in the customers’ local communities because individuals and firms typically conduct the bulk of their banking transactions at banks with local offices.

These two definitions—the relevant line of commerce is a cluster of products and services uniquely supplied by commercial banks, and the relevant geographical market is local—have guided banking antitrust analysis since the 1963 ruling. The federal banking regulators (Office of the Comptroller of Currency, Federal Deposit Insurance Corporation, Office of Thrift Supervision, and Board of Governors of the Federal Reserve System) have since adopted these definitions for their antitrust analyses.

Once a bank regulatory agency has identified the cluster of products and services and the local market, its final step is to determine whether the effect of the merger “may be substantially to lessen competition.” In its ruling, the Supreme Court recognized that the answer to this question involved not only the immediate effects of a merger on competition, but also its anticipated future effects.⁴ Such a prediction relies on the structure of the relevant market—that is, market concentration, the market shares of individual banks, and the number of market competitors. Banking antitrust is based on the assumption that the structure of a market influences how firms in that market will act, which, in

turn, affects the firms’ overall performance.⁵ In other words, the merger’s effect on these measures of “structure,” particularly market concentration, is thought to be a reliable gauge of whether the merger will substantially lessen competition. Therefore, a proposed merger that increases market concentration considerably would likely fail this test, and the federal regulator would not approve it. The federal regulator might approve it, however, if other evidence exists to mitigate the proposal’s anti-competitive effects on market structure. That said, the DOJ could challenge the decision and possibly sue to prevent the merger.

To minimize the chances that a decision will be challenged and to align the antitrust analyses of the federal regulators, the DOJ has periodically issued guidelines that define the circumstances under which an application is likely to exceed its antitrust standards and, therefore, warrant closer scrutiny. The federal banking regulators use these guidelines to help them identify the proposals that are likely to raise concerns about adverse effects of mergers on competition.

The DOJ’s antitrust standards identify potentially anticompetitive mergers in terms of prescribed levels, and changes in levels, of a commonly used measure of market concentration, the Herfindahl-Hirschman Index (HHI). HHI is calculated by squaring each bank’s share of deposits in a market and then summing these squared shares. The index number can range from zero (a perfectly competitive market) to 10,000 (a pure monopoly).⁶ HHI is the preferred concentration index because it accounts for the market share of each bank in the market and gives greater weight to the firms with larger market shares. Other indices, such as the three-firm or four-firm concentration ratio, do not have both of these features.

According to the guidelines, a market can be broadly characterized as unconcentrated if HHI is less than 1000 points, as moderately concentrated if HHI is between 1000 and 1800, and as highly

⁵ The assumption of a link between market structure and the performance of firms in the market is commonly referred to as the structure-conduct-performance hypothesis.

⁶ The perfectly competitive market would consist of many firms, each with about the same market share. As the number of firms in this market increases, each firm’s share decreases until it approaches the limit of zero. The square of zero is zero, so the sum of those squares is still zero. The pure monopoly market would have only one firm that controls 100 percent of the market. The square of 100 is 10,000.

³ *United States v. Philadelphia National Bank*, 374 U.S. 321 (1963). See Shull (1996) for an historical perspective on banking antitrust.

⁴ This is how the Court interpreted Congress’s directive to “arrest anti-competitive tendencies in their ‘incipiency.’”

concentrated if HHI is above 1800.⁷ These thresholds apply not only to banking, but to all industries in the United States. The DOJ distinguishes banking from other industries, however, by allowing it more latitude for *increases* in HHI. That is, the DOJ normally will not challenge a bank merger or acquisition unless the resulting increase in HHI is at least 200 points *and* the post-merger market HHI is at least 1800 (highly concentrated).⁸ For other industries, an increase in HHI of at least 50 points in a highly concentrated market will trigger closer scrutiny by the DOJ. The additional cushion afforded the banking industry accounts for the competition banks now face from thrifts, credit unions, and other providers of financial services. In fact, thrifts—that is, savings and loan associations and savings banks—so resemble banks today in their financial service offerings that federal regulators routinely account for thrift deposits when calculating a banking market's HHI.⁹ Deposits at thrifts are commonly included at 50 percent weight, however, because thrifts target their financial services primarily to consumers and not businesses, which commercial banks typically service.¹⁰ Thrifts' focus on consumers dates back to before deregulation (1980), when they were restricted to accepting only savings deposits and to making predominantly residential real estate loans. Post-1980, changes in the law gradually allowed thrifts to expand their menu of offerings and services, enabling them to resemble and compete more directly with banks. These changes ultimately led the Federal Reserve Banks, in 1987, to incorporate thrift deposits (at half weight) into their market anti-trust analyses.¹¹

⁷ DOJ, Antitrust Division, and the Federal Trade Commission, *1992 Horizontal Merger Guidelines* (revised April 8, 1997).

⁸ See Cynrak (1998, p. 704).

⁹ Savings and loan associations, which may also be known as savings associations, S&Ls, building and loan associations, cooperative banks, or homestead societies, include both mutual and stock associations. Both mutual and stock savings banks are included.

¹⁰ In some cases, deposits at thrifts may be weighted more or less than 50 percent, depending on the level of activity a particular thrift has in a region's commercial lending market. In addition, deposits of thrift subsidiaries of commercial banking organizations are included in the HHI calculation at 100 percent.

¹¹ The DOJ does not include any thrift deposits in its banking antitrust analyses, unless the proposal fails its competitive screen *and* individual circumstances warrant a particular thrift's inclusion at 100 percent weight. One example would be a ratio of commercial and industrial loans to total assets at thrifts in a market area that exceeds 2 percent.

Deposits at credit unions are rarely included in banking antitrust analyses. Being membership organizations, credit unions offer their financial services only to their members, and these services are usually quite limited when compared with those offered by banks and thrifts. As such, credit unions do not necessarily compete in the same product market as banks and thrifts. In certain cases, however, credit union deposits may be included in the analysis of a specific market (at fractional weighting) if substantial evidence supports their inclusion. One piece of such evidence would be that the share of deposits at credit unions in the market area greatly exceeded the national average. In addition, a particular credit union should have liberal membership rules (typically, at least 70 percent of market residents must be eligible for membership) and offices that are easily accessible to local residents.

Determining the change in HHI and its post-merger level is not the end of the story. If these numbers were to fall outside of the DOJ guideline thresholds, it would not automatically mean that the merger or acquisition would be denied. Such an outcome would indicate only that regulators would consider the concentration of the market to be high enough to permit the firms in the market to keep prices above the competitive level for a significant period. Such a case would require that a more-detailed economic analysis be conducted before a decision could be made. This analysis would seek to determine whether other factors, such as potential competition and economic conditions of the market, could mitigate the anticompetitive structural effect of the merger and, thereby, suggest that the HHI does not tell the whole story. An applicant might avoid the more-detailed analysis, however, if it were to choose or agree to divest to a third party some of its offices in the affected markets to get those markets' competitive structures to fall within guidelines.¹²

Having a post-merger HHI and an increase in HHI that exceed DOJ thresholds is not the only reason an application might receive closer scrutiny. A bank that would end up controlling more than 35 percent of the deposits in a particular market after a merger or acquisition would also trigger a more in-depth examination by the Federal Reserve, even if the HHI measures indicate no significant change

¹² Most often, large banking organizations use divestiture of banking offices as a means of securing approval for a proposed merger or acquisition. See Pilloff (2002) and Webb (2001) for discussion of divestiture in antitrust analysis.

Sources of Data Used to Evaluate the Assumptions of Banking Antitrust

MEASURES OF MARKET STRUCTURE

Summary of Deposits

The Summary of Deposits contains deposit data for more than 85,000 branches/offices of institutions insured by the Federal Deposit Insurance Corporation, which collects deposit balances for commercial and savings banks as of June 30 of each year. The Office of Thrift Supervision collects the same data for savings institutions. These data are used for measuring concentration of deposits among depository institutions with offices located in each market area.

Loans Reported under the CRA

Beginning in 1996, all banks and savings institutions (savings banks and savings and loan associations) with total assets in excess of \$250 million, or banks of any size that are subsidiaries of holding companies with assets of \$1 billion or more, must report the number and amount of small business loans by location. Small business loans are defined as commercial and industrial loans of less than \$1 million. Coding of these CRA data by geographic area makes it possible to measure the influence of lending by large depository institutions on banking concentration in market areas where these institutions do not have offices.

MEASURES OF BANK PERFORMANCE

Call Reports

Each quarter, each bank files a balance sheet and an income statement with its supervisor. These data are used for calculating *profit rates*, commonly measured as net income after tax as a percentage of total assets (called return on assets, or ROA).

Some studies use the call report data to calculate *the average interest rates that banks paid on various categories of deposits*. The interest rate paid on each category of deposits is derived by calculating interest paid as a percentage of average deposits. A major challenge involves calculating interest rates on time deposits, since a bank's outstanding time deposit liabilities may have been issued at various points in time in the past. Average interest rates paid calculated with data from the call report are likely to reflect more accurately the interest rates that banks were offering to depositors at the time of the call report for very short-term deposits, such as savings accounts, than for time deposits.

Monthly Survey of Selected Deposits and Other Accounts

Between April 1982 and September 1997, the Federal Reserve asked a sample of several hundred banks to report monthly on the interest rates they paid on specific categories of deposit accounts. In addition, the Fed asked these banks about the fee structures on these deposit accounts in annual supplements that were collected between 1989 and 1997. Since each bank in the sample filed one report, the authors who use these data for testing the SCP hypothesis have to make various adjustments for the fact that many of the banks in the sample had offices in more than one market area.¹

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¹ Simons and Stavins (1998) use data on interest rates from the "Monthly Survey of Selected Deposits and Other Accounts" to test the SCP hypothesis for banks. They assume that each bank in their sample paid the same interest rate on deposits at each of its offices, although they did not have information to support this assumption.

in market concentration.¹³ Indeed, a bank subject to the antitrust authority of the Federal Reserve can certainly control more than 35 percent of total deposits in any given market, but, in most of these cases, the high market share would not have resulted from a merger. For instance, a bank could have achieved a large

market share through internally generated growth rather than through acquisitions; alternatively, a change in market definition may have increased the share of total deposits the bank controls in that market. If a merger or acquisition were to result in a bank controlling more than 35 percent of market deposits, the antitrust analysis would focus on whether any factors might mitigate the anti-competitive effects of that merger. An example of such a mitigat-

¹³ See 12 CFR 265.11 and DOJ, "Bank Merger Competitive Review—Introduction and Overview" (1995), current as of September 2000.

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Bank Rate Monitor

Bank Rate Monitor is the name of a publication that conducts surveys of the interest rates that each office of large banks located in urban areas charges on various categories of loans and pays on various categories of deposits. Data from this source have important advantages over other sources of data for purposes of measuring bank performance. As a survey of the interest rates that banks offer on categories of deposits at various points in time, this source avoids problems inherent in the use of call report data to measure the interest rates that banks offer to pay on time deposits. Data from *Bank Rate Monitor* avoid the problem inherent in the data from the Monthly Survey of Selected Deposits and Other Accounts of interpreting reports by banks that have offices in more than one market area. In addition, the Monthly Survey of Selected Deposits and Other Accounts ceased in 1997, whereas *Bank Rate Monitor* continues to survey the interest rates that bank offices charge on loans and pay on deposits. *Bank Rate Monitor* data, however, are available for only relatively large depository institutions with offices in relatively large metropolitan areas.

Survey of the Terms of Lending to Business

This survey is conducted by the Federal Reserve. Once each quarter, the banks in the survey

sample provide detailed information on each business loan made during a period of one week. This report is used to derive the average interest rate that banks in the sample charged on small loans to businesses. The survey does not include information that can be used to measure the size of the borrowers. These small, business loans are assumed to be made to small businesses.

National Survey of Small Business Finances

The survey, conducted by the National Opinion Research Center for the Board of Governors of the Federal Reserve System during 1987, 1993, and 1998, includes characteristics of firms and owners, the firms' use of financial services and financial service suppliers, and income and balance sheet items. The survey was renamed the Survey of Small Business Finances in 1998.

Survey of Consumer Finances

This Federal Reserve survey, which is conducted at intervals of three years, includes information on selected demographic characteristics of U.S. families, including their income, balance sheets, and use of financial services. Data from this survey are used to examine trends over time in the degree to which households obtained their financial services from depository institutions located in their communities.

ing factor could be that recent economic growth in the market has been strong enough to indicate that it is attractive for entry by other banks or thrifts.¹⁴

This process of antitrust analysis appears quite cut and dried. It relies, however, on several assumptions: Market concentration is the relevant dimension of market structure; market concentration is accurately and adequately measured; and the effects of a merger on market concentration translates consistently into anticipated effects on the pricing behaviors of the players in the market. In other words, the process assumes that the "structure-conduct-performance" (SCP) hypothesis correctly models the true market mechanism and that HHI, used to measure market concentration, reflects the

relevant facets of market structure. Suppose, however, the hypothesis does not accurately model the true market mechanism. In that case, regulators could be using the hypothesis appropriately and drawing the correct conclusions from it, but still end up with unintended policy outcomes because the hypothesis is the wrong analytical model of banking competition in the first place. Several of the following studies directly test whether the SCP hypothesis holds for the banking industry.

In addition, the process of banking antitrust depends on HHI being a reliable measure of market structure. If HHI is not the relevant measure of market structure, the regulators and the DOJ may be missing important structural information that is not captured by HHI. This issue is also addressed in a number of the studies described in the following section.

¹⁴ For other examples of mitigating factors, see Holder (1993).

EMPIRICAL RESEARCH

The literature has pursued various approaches to analyzing the assumptions that underlie banking antitrust. Some studies examine empirical evidence on the assumptions themselves. Other studies test hypotheses about the association between local market concentration and measures of bank performance, such as the profit rates of banks and the interest rates they charge on loans and pay on deposits. In still other articles, which investigate issues other than the validity of the assumptions of banking antitrust, the empirical results end up having implications for the relevance of local market areas for banking antitrust. The boxed insert of this paper describes the various surveys and other sources of data authors have used in such studies.

Evidence on the Validity of the Assumptions

Survey Data: Location of Banks and Their Customers. Several studies use survey data on the location of banks and their customers to assess the validity of the assumption that customers tend to obtain their financial services from firms with offices located in their communities. Kwast, Starr-McCluer, and Wolken (1997) use data from the 1992 Survey of Consumer Finances and the 1993 National Survey of Small Business Finances to examine the extent to which households and small businesses obtain financial services from local bank offices. The authors conclude that the data presented in their study support such an assumption.

Amel and Starr-McCluer (2002) use data from the Survey of Consumer Finances for the years 1989 through 1998 to examine trends over time in the degree to which households obtained their financial services from depository institutions located in their communities. They interpret their results as indicating that households with at least one bank-type account or loan continue, to a substantial degree, to obtain certain key financial services at local depository institutions.¹⁵ The tendency to obtain services from local institutions is especially pronounced for transactions accounts. The data for 1998, however, tend to undermine the concept of a cluster of finan-

cial services that households demand from commercial banks. Except for checking accounts, Amel and Starr-McCluer's results demonstrate that the percentage of households obtaining their financial services from local banks has fallen substantially over time. For instance, the share of households that obtained money market accounts from local depository institutions declined from 78.4 percent in 1989 to 63.6 percent in 1998. The share of households that borrowed from local depository institutions declined from 73.3 percent in 1989 to 44.8 percent in 1998.

Petersen and Rajan (2002) use data from the 1993 National Survey of Small Business Finances to draw inferences about changes over time in the distance between small businesses and the firms that provide their lending and transactions services. Knowing the date the lending relationship began and the distance between the lender and the firm, the authors find that these distances have increased over time, from an average of 51 miles for lending relationships that began in the 1970s to an average of 161 miles for relationships that began in the 1990s. To obtain transactions services, on the other hand, small businesses continue to favor banks with offices in their communities. Petersen and Rajan argue that their results support wider geographic areas for markets in banking antitrust than have been used in the past. The authors acknowledge, however, that their results are subject to several possible biases. One such bias involves the survival of relationships over time. Results for the 1970s, for instance, are based on relationships between small businesses and lenders that began in the 1970s and remained in existence in 1993, the year of the survey.

Approaching the distance question from a different angle, Wolken and Rohde (2002) use data from the National Survey of Small Business Finances for 1993 and 1998. Distances between small businesses and their financial service providers varied substantially by category of service. In both 1993 and 1998, about 96 percent of small businesses obtained checking account services from financial institutions with offices located within 30 miles of the small businesses' headquarters. For those two years, the percentage of small businesses with lines of credit from financial institutions located within 30 miles of their headquarters was about the same: 85.1 percent in 1993 and 83.6 percent in 1998. Thus, small businesses continue to obtain these basic financial services from financial institutions located in their communities.

Although these four studies provide mildly

¹⁵ Bank-type accounts or loans include checking, savings, money market (both money market deposit and money market mutual fund), brokerage, individual retirement, and Keogh accounts; certificates of deposit; trusts and other managed asset accounts; first and second mortgages; motor vehicle loans; home equity and other lines of credit; and other consumer loans. It does not include credit cards.

conflicting empirical support for the assumption that customers continue to receive many financial services from local depository institutions, their results are limited because they reflect only demand for financial services under existing prices. Survey data cannot help us understand how households and small businesses would respond to changes in these prices. The results also do not describe or help determine what share of financial services from local depository institutions is sufficiently high to support the current methods of banking antitrust.

Evidence of National Versus Local Markets for Banking Services. Jackson (1992) tests the hypothesis that the geographic scope of banking markets is national rather than local. In his regression analysis, the dependent variables are the monthly changes in interest rates on three categories of deposits from a sample of banks in 29 metropolitan statistical areas (MSAs). The independent variables include the current and lagged changes in the average monthly rate on the 6-month Treasury bill and a set of dummy variables for each MSA. The null hypothesis is that the sum of the coefficients on the dummy variables for an MSA, which represents how interest rates in the MSA adjust relative to a change in the national rate, is zero. If so, then the rate movements in the MSA match the movement in the national market. If the sum is significantly different from zero, then the interest rate adjustment on a particular type of deposit at banks in the selected MSA is different from that rate's adjustment in the national market. Jackson finds that in a significant number of MSAs the interest rate adjustments on money market deposit accounts (MMDAs) and super NOW accounts are statistically different from adjustments in the national market. In other words, banks do not compete in a national market for MMDAs and super NOW accounts. For 6-month certificates of deposit (CDs), however, the null hypothesis cannot be rejected, which implies that banks do compete for these CDs in a national market. Depositors with MMDAs and super NOW accounts have frequent contact with their banks, whereas customers who invest in 6-month CDs may limit contact with their banks to once every six months. Jackson's results are consistent with the use of local market areas rather than one national market in banking antitrust analysis for certain types of transactions accounts.

Jackson and Eisenbeis (1997), using the same data as Jackson (1992), employ cointegration analysis to determine whether the interest rates on the

various deposit accounts are determined in local or national markets. Using the interest rate on 6-month Treasury bills to represent the national market, the authors test whether the deposit interest rates are cointegrated with the 6-month Treasury bill rate—that is, whether all of the series follow a common long-run trend. If they do, then the authors can conclude that the deposit interest rates are determined in a national market. Jackson and Eisenbeis find that MMDAs, super NOW accounts, and 6-month CDs are all cointegrated with the 6-month Treasury bill rate and, therefore, are all determined in the same national market.

Cointegration analysis, however, is not well-suited to test the hypothesis that banks compete for deposits in a national market because it can detect only the common long-run trend of the series. In the short run, the deposit interest rates banks pay in a local market could deviate substantially from the 6-month Treasury bill rate, thus suggesting they do not compete in the same market. The two series could still be cointegrated (follow a common long-run trend), though.

Are Banks with Offices in the Local Market Area the Relevant Competitors? Would the measure of concentration in a local market area be substantially different if it were adjusted for the financial services provided by firms that do *not* have offices in the market area? Cynrak (1998) investigates this issue using data from the reports required of large banking organizations under the Community Reinvestment Act (CRA). He finds that the market concentration of loans to small businesses tends to be substantially lower if the relevant competitors include all banks that lend to small businesses in the local market area, whether the banks have offices in that local market area or not. The effect on concentration ratios of including the out-of-market lenders is especially pronounced for rural banking markets. Woosley, King, and Padhi (2000) extend Cynrak's work by identifying those rural banking markets where including out-of-market CRA data would cause market concentration to fall below the DOJ's HHI guidelines. These studies raise questions about whether it is appropriate to limit the relevant competitors in antitrust analysis to the banks with offices located in local market areas.

Cynrak and Hannan (1999) investigate whether the concept of a cluster of banking services is relevant for the pricing of bank loans for small businesses. In addition, they investigate whether the

relevant competitors for antitrust analysis are banks with offices located in the local market area. Their measure of bank performance is the interest rate on loans to small businesses, derived from the Survey of the Terms of Lending to Business. About 300 banks report information on each of their business loans originated during one week each quarter.

The authors develop three measures of market concentration:

1. HHI based on the deposits of banks with offices in the market area.
2. HHI based on small business loans by banks with offices in the market area.
3. HHI based on CRA data and an estimate of the amount of small business loans made by small banks with offices in each market area.

The authors find that the HHI measure based on the deposits of banks with offices located in the market area has more power to explain the interest rates charged on small business loans than do the other concentration measures. They conclude that their results support the current approach to banking antitrust, which is based on the HHI calculated for the deposits of banks with offices in each local market area.

Hannan (2003) uses CRA reports to examine the magnitude of loans that relatively large banking organizations made to small businesses located in market areas where the lenders do not have offices. Including lenders with large credit-card business (because small businesses might view credit cards as a substitute for bank loans), there was a large increase in the *number* of small business loans made by out-of-market lenders between 1996 and 2001. The effect of these lenders on the supply of loans to small businesses is much smaller when measured in terms of dollars of lending; it is even smaller if the known credit-card lenders are eliminated as out-of-market lenders. These observations indicate that considerable numbers of small loans from a few large banking organizations with substantial credit-card operations dominate the measures of out-of-market lending that we can derive from CRA data; that is, much of the out-of-market lending is credit-card related.

Hannan also finds that the share of small business loans from out-of-market banks tends to be higher in markets with a relatively high concentration of deposits at in-market banks. He concludes that his results are consistent with an erosion in the

validity of the assumption that banking markets are local geographic areas; he argues, however, that it is not clear at this time whether the erosion would justify a substantial broadening of defined geographic markets for antitrust analysis.

Relevance of Money Market Mutual Funds for Banking Antitrust Analysis. Pilloff (1999c) investigates the degree to which shares of retail money market mutual funds (MMMFs) are substitutes for federally insured accounts at depository institutions. This issue has implications for banking antitrust because, if shares of MMMFs are close substitutes for deposit accounts, then depository institutions with offices in highly concentrated market areas would be less able to extract monopoly profits by paying relatively low interest rates on deposit accounts. Pilloff emphasizes three points in his argument why, for most households, MMMFs are not close substitutes for accounts at depository institutions. First, MMMFs require minimum initial investments that tend to be higher than the minimum initial deposit balances depository institutions require. Second, although MMMFs permit customers to write checks against their shares, the minimum check amounts usually exceed the amount of many routine household payments. Third, MMMFs are not federally insured like accounts at depository institutions, which adds a certain degree of risk.

Pilloff also uses survey data to support his argument that MMMFs are not close substitutes for deposit accounts. According to the survey, only 5.7 percent of households in 1995 owned shares of MMMFs, and almost all of these households also had accounts at depository institutions. Thus, even the small minority of households that held liquid assets with MMMFs did not find it in their interest to close all of their accounts at depository institutions.

Uniform Pricing by Banks with Offices in Many Communities. Another assumption of banking antitrust is that banks set each office's interest rates—those charged on loans and those paid on deposits—according to the concentration in the market area where the office is located. Radecki (1998, 2000), however, finds that banks with offices in several communities within a state offer the same interest rate at each office for a particular loan or deposit category. His data are from the *Bank Rate Monitor*, which reports the interest rates posted by the individual offices of a large number of banks located in many urban areas. Radecki therefore concludes that the geographic area for banking markets in antitrust analysis should be no smaller than a state.

Several staff of the Board of Governors have conducted a number of studies that focus on the implications of Radecki's findings for banking antitrust. For example, Heitfield (1999), using data from the *Bank Rate Monitor*, also finds that banks with offices located in several local market areas (multi-market banks) tend to post the same interest rate on the same type of deposit at each office. Heitfeld extends this analysis by examining the interest rates posted by banks that have all of their offices in one local market area (single-market banks). He finds significant variation across local markets in the interest rates that single-market banks offer on various categories of deposits; he reasons that this variation reflects local market conditions. He does not present results for interest rates on the loan categories in the *Bank Rate Monitor* survey that Radecki includes in his studies. Heitfeld concludes that the results of his study support the current practice of focusing on local market areas in banking antitrust.

Heitfield and Prager (2002) investigate whether the relevant geographic market areas for banking antitrust have expanded beyond the traditional local market areas of MSAs for urban banks and counties for rural banks. They use call report data to estimate the average interest rate each bank paid on NOW accounts, MMDAs, and savings accounts in 1988, 1992, 1996, and 1999. For each category of deposits, the authors regress the bank's interest rate on, among other independent variables, measures of concentration at the local and state levels. They find that the coefficients on the measures of local market concentration are negative and statistically significant in most equations and that the magnitude of the coefficients has not declined over time. In some of the equations, they also find that the coefficients on concentration at the state level are negative and significant. Heitfield and Prager conclude that, although measures of local market concentration remain useful indicators of the market power of banks, measures of market structure for broader geographic areas may be relevant for banking antitrust, too.

Hannan and Prager (2003) investigate whether concentration in local market areas affects the deposit interest rates that single-market banks offer. They find that it does. The authors also find that the interest rates that single-market banks pay on deposits tend to be lower in local areas where multi-market banks account for a greater share of market deposits. Furthermore, the relationship between

local market concentration and deposit interest rates offered by single-market banks becomes weaker as multi-market banks account for larger shares of deposits in those market areas where both have offices.

Tests of the Structure-Conduct-Performance Hypothesis

According to the SCP hypothesis, the ability of banks in a local market area to set relatively high interest rates on loans or low interest rates on deposits depends on the structure of the market. Such behavior is assumed to be more effective in market areas where concentration is relatively high. Hannan (1991b) examines the theoretical foundation for this SCP hypothesis in banking. Table 1 summarizes several features of studies that test hypotheses about the effects of local market structure on various measures of bank performance.

Effects of Local Market Concentration on Bank Profits. Banks that are more effective in affecting the interest rates they charge on loans and pay on deposits will tend to have higher profits. Some studies test the hypothesis that there is a positive association between the profit rates of banks and local market concentration.

Rhoades (1995) tests the hypothesis that measures of market structure in addition to HHI influence the profit rates of banks. In regressions with the average profit rate of banks in market areas as the dependent variable, the coefficient on HHI is positive and statistically significant. He finds, however, that other indicators of market structure, including the number of banking organizations with offices in the market area and measures of the inequality of banks' market shares in local areas, are also significant.

Moore (1998) investigates whether, in response to financial innovations and changes in regulations, the influence of local market structure on bank profits has tended to decline over time. In his analysis, the measure of performance is net income after taxes divided by total assets (return on assets, or ROA) of all banks in the market area. The measure of market structure is HHI. Moore finds that the statistical significance of HHI has declined over time for rural market areas. With the ROA of each market in the sample as the dependent variable, the coefficient on HHI was positive and statistically significant for rural areas in 1986 and 1987, but not in 1996 and 1997. In similar regressions for urban markets, the coefficient on HHI was not statistically significant for any of these four years. Moore concludes that,

Table 1

Tests of the Structure-Conduct-Performance Hypothesis for the Banking Industry

Authors	Measures of bank performance	Measures of markets structure	Sample	Consistent with current practice of bank antitrust?
Effects of market concentration on the profit rates of banks				
Rhoades (1995)	Mean ROA of the banks in each market	HHI and other measures of market structure	1,684 urban and rural markets, 1990-92	Yes
Moore (1998)	ROA of individual banks	HHI	Urban areas and rural counties, 1986, 1987, 1996, and 1997	No
Pilloff (1999c)	ROA of individual banks	HHI and measures of multi-market contact	6,233 banks, 1992-95	Yes ^a
Pilloff (1999b)	ROA of individual banks with all offices in the rural banking markets included in the study	HHI and the presence of large banking organizations in rural market areas	1,728 institutions with offices in 762 rural banking markets, 1995-96	Yes
Pilloff and Rhoades (2002)	Mean ROA of banks in each market	HHI	National sample of urban and rural markets, 1975-98	Yes
Akhigbe and McNulty (2003)	Profit efficiency relative to the banks on the efficient frontier	HHI	35,807 observations, 1990, 1992, 1994, and 1996	Yes
Berger (1995)	ROA and ROE	HHI	4,800 banks, 1980-89	No ^b
Frame and Kamerschen (1997)	ROA	Market share of each bank in the sample	Quarterly data for 208 banks with all offices in one rural county in Georgia, 1990:Q4-1994:Q4	Qualified yes ^c
Effects of market concentration on the interest rates that banks pay on deposits				
Berger and Hannan (1989)	The interest rates that banks paid on MMDAs, NOW accounts, and time deposits of various maturities, from the MSSDOA	CR3	Quarterly data for 470 banks in 195 local banking markets, September 1983-December 1985	Yes ^d
Calem and Carlino (1991)	Interest rates paid by banks on MMDAs and 3- and 6-month CDs, from the MSSDOA	CR3	466 banks in 105 urban banking markets, October 1983-November 1987	Yes

Table 1, cont'd

Authors	Measures of bank performance	Measures of markets structure	Sample	Consistent with current practice of bank antitrust?
Sharpe (1997)	Interest rates paid by banks on MMDAs and 6-month CDs, from the MSSDOA	HHI	Monthly data on interest rates for 222 banks located in 105 markets, October 1983–November 1987	Yes
Hannan (1997)	Interest rates paid by banks on NOW accounts, MMDAs, and 3-month CDs, from the MSSDOA	HHI, measures of market share inequality, and number of banks in the market	About 300 urban banks, November 1993	No: coefficients on HHI not statistically different from zero
Prager and Hannan (1998)	Interest rates paid by banks on NOW accounts, MMDAs, and 3-month CDs, from the MSSDOA	HHI	468 banks: 26 in markets with substantial mergers, 30 in markets with less-substantial mergers, 412 in markets not affected by mergers; interest rate data for October 1991–August 1994	Yes: declines in interest rates over the sample period were larger at the banks in market areas with substantial horizontal mergers, as defined in the DOJ guidelines
Heitfield and Prager (2002)	Interest rates paid by banks on NOW accounts, MMDAs, and savings accounts, derived from call reports	HHI and CR3	Most banks in the United States, 1988, 1992, 1996, and 1999	Qualified yes: measures of concentration statistically significant at both the local and state level
Hannan and Prager (2003)	Interest rates paid by single-market banks (those with most of their deposits from offices in one market) on NOW accounts, MMDAs, and savings accounts, derived from call reports	HHI	7,700 single-market banks in 1,925 urban and rural areas (1996) and 6,502 single-market banks in 1,806 banking markets (1999)	Yes, except the results are consistent with a declining influence over time in the effects of local market structure on deposit interest rates

Effects of market concentration on the responsiveness of deposit interest rates to changes in market rates

Hannan and Berger (1991)	Interest rates paid by banks on MMDAs, from the MSSDOA	HHI	Monthly data on deposit interest rates paid by 398 banks in 132 banking areas, September 1983–December 1986	Yes
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Table 1, cont'd

Authors	Measures of bank performance	Measures of markets structure	Sample	Consistent with current practice of bank antitrust?
Neumark and Sharpe (1992)	Interest rates paid by banks on MMDAs and 6-month CDs, from the MSSDOA	HHI	255 banks in 105 urban markets, interest rates on deposits, October 1983–November 1987	Yes
Hannan and Liang (1993)	Responsiveness to the yields on Treasury securities of the interest rates paid by banks on MMDAs and 2- and 3-year CDs, from the MSSDOA	CR3	About 300 banks, 1983-89	Yes
Khan, Pennacchi, and Sopranzetti (1999)	Interest rates paid by banks on MMDAs and CDs with maturities of 3, 6, and 12 months, from the MSSDOA	HHI	Over 600 banks, November 1983–May 1994	Yes: banks located in market areas with higher HHI are more likely to set their deposit interest rates as integers or quarter integers ^e
Effects of market concentration on the interest rates that banks charge on loans				
Cyrnak and Hannan (1999)	Interest rates charged by banks on small business loans (\$100,000 or less) in the STLB	Three measures of HHI ^f	228 banks located in 98 urban areas that participated in the STLB in May 1996	Yes
Hannan (1991a)	Interest rates charged by banks on business loans, from the STLB	HHI	8,250 business loans by 260 urban banks, from reports in different interest rate environments, 1984, 1985, and 1986	Yes
Hannan and Liang (1995)	Interest rates charged by banks on business loans less than \$100,000, from the STLB	HHI	Over 300 banks' small business loans, August 1989, May 1990, and May 1991	Qualified yes: equations with the best fit use HHI calculated with zero weight for thrift institutions

Table 1, cont'd

Authors	Measures of bank performance	Measures of markets structure	Sample	Consistent with current practice of bank antitrust?
Hannan (1997)	Interest rates charged by banks on small business loans (less than \$100,000), from the STLB	HHI measures of market share inequality and number of banks in the market	Loans reported by sample of banks in November 1983: 511 unsecured loans and 2,059 secured loans	Qualified yes: HHI does not reflect the only relevant measure of market structure; the number of banks in the market also affects loan rates
Berger, Rosen, and Udell (2001)	Interest rates charged by banks on loans to small businesses under lines of credit in 1993 ^g	HHI and the asset size of organizations with offices in the market areas	520 small businesses that obtained credit from their banks under lines of credit in 1993	Qualified yes ^h
Kahn, Pennacchi, and Sopranzetti (forthcoming)	Interest rates charged by banks on consumer and auto loans: data from the <i>Bank Rate Monitor</i>	HHI	Weekly surveys of interest rates quoted by large banks in 10 urban areas, 1989-97	Yes: interest rates on consumer loans are higher in market areas with higher HHI ⁱ

NOTE: ROA, annual net income after taxes divided by average annual assets; ROE, annual net income after taxes divided by the book value of equity; HHI, Herfindahl-Hirschman Index (see section "Current Method of Antitrust in the Banking Industry"); CR3, percentage of deposits at banking offices in a market area at the institutions ranked first through third in terms of deposits at offices in the market area; MMDA, money market deposit account: a short-term deposit account at a depository institution on which customers may write a limited number of checks; NOW account, a transactions account available to individuals and non-profit organizations on which depository institutions may pay interest; CD, abbreviation for certificate of deposit, which is an interest-earning deposit account with a fixed maturity date; MSSDOA, Monthly Survey of Selected Deposits and Other Accounts (see boxed insert); STLB, Survey of the Terms of Lending to Businesses (see boxed insert).

^aPilloff (1999c) also finds that the coefficient on the measure of multi-market contact is consistent with the linked oligopoly theory.

^bA positive association between profit rates and market concentration disappeared when measures of X-efficiency were added as independent variables.

^cThe empirical results are consistent with the hypothesis that the banks in the sample exercised market power. The measure of market structure, however, is the market share of the sample bank, not a measure of market concentration. The only aspect of market share that is relevant under the current banking antitrust procedures for banking involves closer scrutiny for cases in which a merger creates a bank with a market share of 35 percent or higher.

^dAlthough the published results use CR3 as the measure of market concentration, the results are qualitatively similar using HHI.

^eThe model developed by Kahn, Pennacchi, and Sopranzetti (1999) implies that banks in less competitive markets are more likely to use integers to set the interest rates they offer to pay on deposits.

^fThe three measures of HHI in Cynrak and Hannan (1999) are based on (i) the deposits of banks with offices located in each market area, (ii) the small business loans of banks with offices in the market areas, and (iii) the second measure of HHI adjusted for business loans to residents of each market area by large banks that do not have offices in the market area.

^gBerger, Rosen, and Udell (2001) derive interest rates on loans from the National Survey of Small Business Finances, 1993.

^hBerger, Rosen, and Udell (2001) find a dimension of local market structure not considered in banking antitrust: the total assets of banks with offices in the market area.

ⁱIn Kahn, Pennacchi, and Sopranzetti (forthcoming), results of analysis of the effects of mergers on consumer interest rates and the dynamics of consumer interest rates in response to changes in market areas are also consistent with the assumptions of banking antitrust.

because market concentration no longer seems to have a significant effect on bank profits, local areas are no longer the relevant market areas for antitrust.

Pilloff (1999a) estimates a regression in which the dependent variable is the ROA of individual banks and the independent variables include market HHI and measures of multi-market contact among the banks with offices in the market. His finding that the coefficients on HHI are positive and statistically significant supports the current approach to banking antitrust. Pilloff also finds that the coefficients on measures of multi-market contact among the banks in each market area are positive and statistically significant, providing empirical support for the linked oligopoly theory—that is, when the same banks compete with each other in several different markets, they will tend to limit their rivalry for customers in each of the markets.

Pilloff (1999b) examines the determinants of ROA among small, rural banks that have all of their offices in local markets, which are identified as counties. Pilloff estimates the effects of market HHI and the presence of the offices of large banking organizations on the ROA of small banks. While Pilloff finds that the presence of offices of large banks in rural markets tends to increase the ROA of small banks (a sign of reduced competition), he also finds that the coefficient on HHI is insignificant. The insignificant coefficient on HHI may reflect the inclusion of another independent variable, a measure of market size that tends to be correlated with market concentration.

Pilloff and Rhoades (2002), using data for a large number of rural and urban banking markets for the years 1975 through 1998, test the hypothesis that banks located in market areas with higher concentration tend to have higher profit rates. The authors regress the mean ratio of net income to total assets for banks in market areas (the dependent variable) on HHI and other measures of market structure, including the number of banking firms with offices in the market areas (the independent variables). The authors find that the coefficients on HHI are consistently positive and statistically significant at the 1 percent level. Other measures of market structure, including number of firms, have significant coefficients in some years, but not in others.

Akhigbe and McNulty (2003) examine the association between bank profits and local market concentration using a technique that estimates the profit efficiency frontier for given levels of loans, deposits, and other determinants of bank profits. They estimate each bank's deviation from the profit-efficiency

frontier as a function of various explanatory variables, including market concentration (HHI). They find that the banks located in market areas with higher HHI (more concentrated) tend to be closer to the profit frontier.

These six studies examine whether the data support the hypothesis of a static, contemporaneous association between bank profits and market concentration. Amel and Liang (1997), in contrast, examine the evidence of a dynamic relationship between bank profits and market structure. They report evidence that lagged profit rates of local banks tend to induce entry by additional banks, which, in turn, reduces that market's concentration. De novo entry, however, would likely not affect a market's concentration too much because de novo banks tend to control only a small share of a market's total deposits for many years. Amel and Liang's results are especially interesting because their data are for the years 1977 through 1988, a period when barriers to entry into banking markets were higher than they are now.

SCP Versus Efficiency. A problem with using the relationship between bank profit rates and market concentration as a way to test the validity of the SCP hypothesis is that an alternative hypothesis, the efficient-structure hypothesis, leads to the same relationship. Because of this similarity, a more-detailed description of the two hypotheses will help place the related empirical studies in their proper context. The SCP hypothesis takes local market concentration as given and considers, for example, the implications of that concentration for the ability of banks to effectively collude on the terms of the services they offer to their customers. According to the SCP hypothesis, banks located in more concentrated market areas should be able to detect local banks cheating on collusive agreements, and enforce penalties for such cheating, more effectively than banks located in less concentrated market areas. The observed outcome would be that markets with higher concentration have banks that earn higher profits.

The efficient-structure hypothesis, rather than taking market concentration as given, considers the economic factors that help explain variation in concentration across markets. To illustrate how economic factors could influence market concentration, assume initially that all market areas have equal demand for banking services and that each bank has the same cost structure. In addition, assume that each bank is small relative to the demand for banking services in each market area. Under these

assumptions, each market has the same number of identically sized banks and the economic profits at all banks are zero. That is, each bank's profit equals the return it would have earned had it invested its capital in a firm in an industry other than banking.

Now suppose that some of the banks in some markets discover ways to change their cost structures such that at each level of output their total costs are lower than those of the other banks. The low-cost banks can then reduce their prices slightly (presumably by not as much as costs fell) to increase their market shares and, consequently, earn higher profits than the high-cost banks. And since the low-cost banks will be larger than other banks, market concentration will be higher in the market areas where the low-cost (high-profit) banks are located. The observed outcome again would be that markets with higher concentration have banks that earn higher profits.¹⁶

This analysis illustrates why evidence of a positive association between bank profits and market concentration is consistent with both the SCP and efficient-structure hypotheses. The analysis also demonstrates why evidence of an association between the *prices* of bank services and market concentration would tend to provide more relevant tests of the SCP hypothesis than evidence of an association between bank profit rates and market concentration.

Berger (1995) investigated whether empirical evidence of an association between local market concentration and bank profits would provide support for the SCP hypothesis or the efficient-structure hypothesis. He found that the positive association between bank profit rates and market concentration disappeared when a measure of the cost efficiency of banks was added to the regressions as an independent variable, which is consistent with the efficient-structure hypothesis. Thus, his empirical results do not support the current approach to banking antitrust. Berger emphasized that each of the equations in his study explains little of the variation in bank profit rates, with median R^2 across equations below 0.1, a finding similar to that in Pilloff and Rhoades (2002) and Pilloff (1999a).

Frame and Kamerschen (1997), following Berger (1995), included a sample of banks that operated in an environment with relatively high legal barriers

to entry: banks with all of their offices located in rural Georgia counties during a period of the 1990s when these banks were protected from intrastate branching. In their profit equation, the measure of cost efficiency is not statistically significant, while the measure of market structure is statistically significant with and without the cost efficiency measure as an independent variable. The sign of the coefficient on the market structure variable is consistent with the SCP hypothesis. The results in Berger (1995) and Frame and Kamerschen (1997) imply that the interpretation of a positive association between profit rates and market concentration may depend on the level of barriers to entry.

The studies examining the association between bank profit rates and market structure do not provide consistent support for the current approach to banking antitrust. Analysis of the association between the prices of bank services and market structure may yield more conclusive tests of the SCP hypothesis for the banking industry.

Effects of Local Market Concentration on Interest Rates Paid on Deposits. The SCP hypothesis implies that banks located in market areas with relatively high concentration will tend to pay relatively low interest rates on deposits. Most of the studies that examine the effect of banking market concentration on deposit interest rates use data from the "Monthly Survey of Selected Deposits and Other Account." The boxed insert describes this survey.

In a widely cited article, Berger and Hannan (1989) examine the effects of local market concentration on the interest rates banks paid on MMDAs between September 1983 and December 1985. They find that the coefficient on local market concentration is negative and statistically significant at the 1 percent level. The size of this coefficient indicates that if the concentration of the least concentrated market were increased to that of the most concentrated market, the interest rate banks in that market paid on MMDAs would decline by about 50 basis points. The results of most of the studies listed in the section of Table 1 on deposit interest rates are qualitatively similar to those of Berger and Hannan (1989).

Prager and Hannan (1998) investigate the effects of bank mergers on deposit interest rates. Table 1 describes their sample of banks and measures of deposit interest rates. Market interest rates declined over their sample period. Declines in deposit interest rates were larger at banks located in markets where

¹⁶ See Carlton and Perloff (2000, Chap. 8) for a discussion of the literature on the SCP and efficient-structure hypotheses.

mergers created substantial increases in HHI, as identified in the DOJ's guidelines, than at banks located in other market areas. The results in Prager and Hannan (1998) are consistent with the assumptions that underlie the current approach to banking antitrust analysis.

Two studies, Heitfield and Prager (2002) and Hannan and Prager (2003), use recent call report data to derive estimates of the interest rates that banks paid on various short-term deposits. To derive these estimates, the authors divided each deposit category's quarterly interest expense by its average quarterly deposit balance, a method that is more appropriate for short-term deposits than for long-term deposits because data for long-term deposits reflect deposits made over various dates in the past. Both studies find evidence to support the assumption that deposit interest rates tend to be lower in market areas with higher market concentration. Heitfield and Prager (2002) also find evidence that banks in states with higher state-level banking concentration rates tend to pay lower deposit interest rates. Hannan and Prager (2003) find evidence that industry consolidation through nationwide branch banking is weakening the influence of local market concentration on deposit interest rates.

Effects of Local Market Concentration on the Responsiveness of Deposit Interest Rates to Changes in Market Rates. The studies discussed in this section examine the influence of local market concentration on the dynamics of the interest rates that banks pay on deposits. This section discusses some of the details of each study because they have unique features. Table 1 presents additional information about these studies.

Hannan and Berger (1991) develop a theoretical framework to illustrate how local market concentration affects banks' deposit pricing in the face of changing market interest rates. In this model, banks in more concentrated markets exhibit more price rigidity than banks in less concentrated markets. The authors test the model empirically by estimating the probability that a bank, given its market's concentration, will adjust its deposit interest rate up, down, or not at all in response to a change in the market rate—in this case, the 3-month Treasury bill rate. They find that banks in more concentrated markets have a lower probability of increasing deposit rates when market rates rise. Market concentration has no effect on the probability of decreasing interest rates when market rates fall, however. In other words, banks in less competitive markets are

less responsive to upward changes in Treasury bill rates than those in more competitive markets; but they are just as responsive to downward changes in Treasury bill rates. These results support the hypothesis that banks in a more concentrated market behave less competitively.

Neumark and Sharpe (1992) estimate the effects of market concentration on deposit interest rates with an asymmetric partial equilibrium model. The authors find that banks in markets with higher concentration paid lower equilibrium interest rates on MMDAs and 6-month CDs. Moreover, Neumark and Sharpe find that, when market interest rates changed, MMDA rates at banks in more concentrated markets tended to go up slower and down faster than at banks in less concentrated markets. Market concentration affected rates on 6-month CDs similarly, but not as strongly. The difference between the MMDA and 6-month CD results may reflect a tendency for bank customers to shop in wider geographic areas for longer-term investments. It may also reflect greater reluctance for banks to raise interest rates on MMDAs than on CDs, since an increase in the interest rate a bank pays on MMDAs affects its interest expense on all MMDAs, whereas an increase in the interest rate it pays on CDs affects only its marginal CD accounts—newly contracted CDs and rollovers—because the interest rates paid on CDs issued in the past remain unchanged.

Hannan and Liang (1993) test the hypothesis that banks are price takers in the markets for MMDAs, 2-year CDs, and 3-year CDs. For each of the more than 300 banks in the sample, they estimate a time-series equation for each deposit category, using monthly data between October 1983 and May 1989. In each equation, the authors regress the interest rate paid by the bank on the yield on Treasury securities with comparable maturity. If the coefficients on the Treasury security yields are less than 1, Hannan and Liang can reject the hypothesis that banks are price takers. For MMDAs, the coefficient is significantly less than 1 for almost all of the banks in the sample. For 2- and 3-year CDs, the coefficient is significantly less than 1 for most of the banks. The mean coefficient for MMDAs is less than, and statistically different from, the mean coefficients for 2- and 3-year CDs. These results are consistent with the view that banks exercise market power in their local market areas. It also implies that bankers have greater ability to exercise market power when pricing MMDAs than when pricing time deposits with 2- or 3-year maturities.

In the next step in their analysis, Hannan and Liang investigate whether the degree of market concentration affects the size of the coefficients described above. They find that when MMDA interest rates are the dependent variable, the coefficients on market interest rates tend to be lower among banks located in market areas with higher concentration. For interest rates on 2- or 3-year CDs, there is not a statistically significant correlation between the coefficients on market interest rates and banking market concentration. These results imply that the banks operating in more concentrated local markets exercise greater market power when pricing MMDAs, but, because competition for CDs occurs on a broader geographic scale, local market concentration does not influence their rates. The results in Hannan and Liang (1993) are consistent with the assumptions that underlie banking antitrust.¹⁷

Kahn, Pennacchi, and Sopranzetti (1999), taking a different approach, develop a theory of how banks set the interest rates they pay on retail deposits (in denominations of less than \$100,000) that is based on customers' limited ability to recall numbers when comparison shopping. Because customers are assumed to recall only a limited number of digits, banks tend to quote deposit interest rates either in whole integers, such as 3 percent or 4 percent, or at a limited number of points between whole integers. The authors find empirical support for their theory. Deposit interest rates were more likely to remain unchanged after changes in wholesale market interest rates if banks had initially set the deposit rates at whole integers. In addition, banks in local markets with higher concentration were less likely to respond to changes in wholesale market interest rates and more likely to set deposit interest rates at integers or quarter-integers. The results of the articles cited in this section are consistent with the assumptions that underlie banking antitrust.

Effects of Local Market Concentration on Interest Rates Charged on Bank Loans. The SCP hypothesis implies that banks in market areas with higher concentration will tend to charge higher interest rates on loans.¹⁸ An important challenge

in estimating the effect of market concentration on loan rates involves holding constant lending risk and the effects of other loan terms. Although the studies discussed in this section attempt to do this, their estimates may still be biased because of imperfect adjustments for risk and loan terms.

One study on this issue, Cyrnak and Hannan (1999), is discussed above. Hannan (1991a) derives empirical tests for two of the assumptions of banking antitrust: first, markets are local; second, performance is influenced by market concentration. He tests the hypothesis that markets are local by estimating two equations. In one equation, the interest rates on business loans are determined in a national market; in a second equation, the interest rates on business loans are assumed to vary among metropolitan areas. The equation that incorporates local effects has more explanatory power for business loans than the equation that is based on a national market. Hannan also finds a positive association between the interest rates that banks charge on relatively small business loans and the concentration of deposits in the local banking market areas. Thus, he finds empirical evidence to support the two banking antitrust assumptions.

The objective of Hannan and Liang (1995) is to investigate the weight that deposits at thrift institutions should receive when calculating measures of market concentration. The dependent variable is the interest rate on business loans. Independent variables include market HHI, calculated under various assumptions about the weights assigned to deposits at thrifts; other measures of market structure; and other variables that reflect characteristics of the loans, the lending banks, and the market areas where the banks have their offices. In the regressions with zero weights for thrift institutions, the coefficients on HHI are positive and statistically significant. Assigning positive weights to thrift deposits when calculating market HHI makes the fit of the regression equations worse. These results do not support inclusion of thrift institutions in the HHI calculation for purposes of banking antitrust. Because routine antitrust analyses focus on deposits and not loans to small businesses, however, this empirical test does not necessarily rule out a positive weight for thrift deposits in those routine analyses.

Hannan (1997) uses interest rate data on individual business loans as the measure of bank performance. As independent variables, he uses HHI and other measures of market structure, along with other variables that reflect the characteristics

¹⁷ Jackson (1997) discusses reasons why the relationship between market concentration and price rigidity may be nonlinear and presents evidence of such a nonlinear relationship for banking markets.

¹⁸ In a theoretical model that incorporates asymmetric information about borrowers' likelihood of repaying a loan, Shaffer (2002) examines the relationship between the interest rates on bank loans and market concentration. He finds that there are conditions under which the SCP hypothesis is valid even if the empirical results indicate no association between measures of interest rates on loans and measures of market structure.

of the loans, lending banks, and market areas where the banks have offices. The regression coefficients on HHI are positive and statistically significant. The coefficients on the number of banking organizations in the market are negative and statistically significant. These results are consistent with giving greater weight to the number of banking organizations in market areas in banking antitrust analyses.

Berger, Rosen, and Udell (2001) expand on the conventional methods of examining how interest rates on loans to small businesses are determined by including a measure of the size structure of the market in their analysis. The size structure of the market represents the distribution of the banks with offices in the local area by the size of their total assets in all market areas. The authors posit that large regional or national banking organizations may compete differently from small, local institutions and that banks' competitive strategies may depend on the sizes of banks in a local market. Berger, Rosen, and Udell find several results to support their suppositions: First, small businesses pay lower interest rates when large banks dominate a market; second, size structure primarily affects the prices at large banks; and, third, size structure is statistically significant only in the markets in which small banks control relatively large shares of market deposits. These findings show that market size structure is important to bank pricing behavior and that banks compete less aggressively in markets dominated by small banks. One implication of this study, which supports the current approach to banking antitrust, is that local market areas are still relevant for bank behavior. Another implication, however, is that market size structure may also be relevant for antitrust analysis, a facet of markets not considered in current banking antitrust procedures.

Kahn, Pennacchi, and Soprano (forthcoming) examine the association between banking market concentration and interest rates on consumer and auto loans. They find that local banking market structure does not affect auto loan rates. One explanation for this result is that interest rates on car loans are now predominantly determined by financing available through the auto manufacturers. The results are different for the interest rates on consumer loans. These interest rates tend to be higher at banks in more concentrated market areas. Moreover, interest rates on consumer loans tend to respond asymmetrically to changes in market interest rates. Banks increase consumer loan rates in tandem with market rates as they rise, but they

reduce consumer loan rates more slowly than market rates as they fall. This asymmetric response is more pronounced for banks in more highly concentrated markets.

The results from studies cited in this section are consistent with some of the assumptions that underlie banking antitrust: Markets for banking services are local and local banks are the relevant competitors. Results in Hannan (1997), however, indicate that the number of banking organizations with offices in a market area should also receive some weight in antitrust analysis. Berger, Rosen, and Udell (2001) indicate that, in addition to local market concentration, the size structure of local market areas may affect the degree of competition among banks in those markets.

Monopoly Profits and the "Quiet Life." If relatively high market concentration facilitates collusion among banks, then banks located in more highly concentrated markets should face less pressure to minimize their operating costs. Such an inverse relationship between cost efficiency and market concentration is a version of the "quiet life" hypothesis, which is based on a statement by John Hicks that "the best of all monopoly profits is a quiet life" (Hicks, 1935, p. 8). Analysis of the quiet life hypothesis has a long history in the literature on banking antitrust (Rhoades and Rutz, 1982; and Edwards and Heggstad, 1973). Berger and Hannan (1998) test the hypothesis using data from the 1980s and find evidence that banks in more highly concentrated markets exhibit poorer cost efficiency than do other banks, all else equal. In fact, the authors show that if the concentration level in the most concentrated market were reduced to the minimum level observed in their sample, operating costs at banks in that market would be expected to decline between 8 percent and 32 percent. In addition, they conclude that the size of the additional operating cost due to market concentration (efficiency loss) is several times larger than the size of the additional revenues due to noncompetitive pricing of banking services (welfare loss).

Bergstresser (2001a) tests another version of the quiet life hypothesis: Banks with greater market power tend to assume less risk than other banks. He tests this version of the hypothesis by examining the association between the percentage of bank loans in a high-risk category (construction and land development loans) and local market concentration. The data are derived from bank call reports for the years 1980 through 1994. Bergstresser finds

that banks located in market areas with higher concentration tend to have lower shares of construction and land development loans in their loan portfolios. These results are consistent with the current approach to banking antitrust.

Other Evidence Relevant for Banking Antitrust

Effects of Local Banking Concentration on the Decision To Join a Credit Union. Emmons and Schmid (2000) examine how local banking market concentration influences the decisions of residents to join credit unions. They measure credit union participation as the percentage of potential members who actually choose to become members. They find a positive association between this measure of credit union participation in the current period and the lagged value of concentration in the banking markets where the credit unions are located. Their results can be interpreted as evidence that banks in areas of relatively high concentration offer their banking services at relatively unattractive terms, such as high interest rates on loans, low interest rates on deposits, or poor service. In response, a relatively high percentage of eligible households in these areas join credit unions.

Effects of Competition from Credit Unions for the Pricing of Bank Services. Three recent studies find that credit unions influence the interest rates that banks charge on loans and pay on deposits. Tokle and Tokle (2000), using interest rate data on small-denomination deposit accounts gathered from telephone surveys of banks in Idaho and Montana, estimate the effect local credit unions have on deposit interest rates at local banks. Their results indicate that the share of market deposits at credit unions has positive effects on deposit interest rates at local banks. Feinberg (2001), using *Bank Rate Monitor* data, finds that the share of market deposits at credit unions has a negative and statistically significant effect on new car loan rates at local banks. Hannan (2002), also using *Bank Rate Monitor* data, finds that various measures of credit union market penetration have positive and statistically significant effects on the interest rates that banks pay for deposits. The results of these three studies provide empirical support for the current practice of defining markets as local. The results raise questions, however, about the current practice of rarely including credit union deposits in local market concentration calculations.

Effects of Market Concentration on Economic Growth. Collender and Shaffer (2003) examine how various measures of local banking market structure, including market HHI, affect local economic growth. They measure economic growth as the change in per capita personal income at the county level for rural counties and at the MSA level for urban counties. They find that economic growth is slower in urban markets with higher concentrations of deposits. In contrast, they find that local market concentration has no effect on economic growth in rural areas.

Demonstrating that a bank merger would lead to slower economic growth in the local market is not necessary to establish a violation of antitrust standards. That said, the results in Collender and Shaffer have implications for the delineation of banking market areas in antitrust analysis: Had financial innovations and regulatory changes made local markets irrelevant for antitrust analysis, the authors would not have found any association between local economic growth and measures of local banking structure.

Local Market Concentration and Credit Availability to Borrowers without Credit Histories. Petersen and Rajan (1995), starting from the assumption that lenders have less information about new firms than about more established firms, develop a theory of the supply of bank credit to new firms. In this theory, Petersen and Rajan posit that credit availability to new firms depends on the degree of bank competition in local market areas. Banks located in areas with relatively limited competition know that, if they lend to new firms and the firms are successful, they are likely to keep these firms as customers in the future. In other words, banks that face limited competition view loans to new firms as risky investments that may yield long-term profits if the new firms survive. Banks located in areas with more intense competition, on the other hand, know that competitors eventually will bid away any long-term profits that banks might expect to gain from relationships with new firms that are successful. These banks, then, do not have reason to view risky loans to new firms as potentially yielding long-term profits.

Petersen and Rajan use data from the 1987 National Survey of Small Business Finances to develop an empirical test for their theory of credit availability to new firms. The following quotation presents the conclusions of their study:

Young firms in concentrated markets receive more institutional finance than do similar firms in competitive markets. As firms get old, the difference in the relative firms borrowing from institutions disappears. Young firms who get institutional loans are more indebted in concentrated markets than in competitive markets, but this pattern reverses for older firms. Creditors seem to smooth interest rates over the life cycle of the firm in a concentrated market, charging a lower-than-competitive one when the firm is young and a higher-than-competitive rate when the firm is old. (p. 439)

Petersen and Rajan's results are consistent with the view that local market areas are relevant for banking antitrust.¹⁹

Bergstresser (2001b) applies the Petersen and Rajan (1995) framework to consumer lending. He posits that consumers without credit histories located in more concentrated banking markets should face fewer constraints when obtaining credit than similar consumers located in less concentrated markets. This theory, similar to that for new firms, is based on the idea that, in less competitive (more concentrated) areas, banks view loans to consumers with no credit histories as risky investments that are likely to yield long-run profits if these consumers pay their debts. In the more competitive (less concentrated) markets, borrowing constraints are higher for consumers without credit histories because, once these customers have established credit histories, competing banks will bid interest rates on their loans down to the competitive level.

To test this theory, Bergstresser estimates two equations using data from the 1983 Survey of Consumer Finances, which is the last of these surveys for which the MSA of each respondent is publicly available. In each equation, the observations are for individual households. In the first equation, the dependent variable is a dummy variable with a value of 1 if the household reports that it received less credit from banks than it requested, zero otherwise. One of the independent variables is the HHI

of the MSA where the household resides. In various specifications, the coefficients on HHI are negative and statistically significant. That is, living in an area with relatively high banking concentration reduced the odds that consumers reported receiving less credit than requested.

In Bergstresser's second equation, the dependent variable is the interest rate that the household paid on a bank loan. Independent variables include the age of the head of the household and other control variables. This equation is estimated separately for households in areas with HHI above and below a threshold for relatively high concentration. In areas of high and low concentration, interest rates tend to decline with age, but the decline is smaller in the high concentration markets than in the low concentration markets. The difference in the rates of decline because of age between these two equations is statistically significant. The empirical results for both equations are consistent with the theory developed by Petersen and Rajan (1995). The results in Bergstresser (2001b) are consistent with the view that local market areas are relevant for banking antitrust.

The relevance of the Petersen and Rajan (1995) and Bergstresser (2001b) studies for banking antitrust analysis is limited, however, because both studies use data from the 1980s. Financial innovation and the relaxation of branching restrictions may have reduced the ability of banks in markets with relatively high concentration to derive long-term economic profits from relationships with new firms or with households without credit histories. Evanoff and Fortier (1988) emphasize that branching restrictions alter the nature of the relationship between local market concentration and bank performance.

Zarutskie (2003) extends the analysis of bank market structure and the availability of credit to new businesses into the 1990s by using income tax data for small U.S. corporations for the years 1987 through 1998. She finds that local banking market structure affects the likelihood a new firm will borrow from banks in a manner consistent with Petersen and Rajan's (1995) theory: In more concentrated markets, young firms are more likely to borrow from banks than from owners' savings. She also finds, though, that the effects of local market structure are weaker after 1995, the period when nationwide banking was permitted under federal legislation.

¹⁹ The discussion of the following studies focuses on those that test the Petersen and Rajan (1995) theory empirically by using local market areas in the United States as the relevant market areas. Several other studies, some using international rather than just U.S. data, have also tested this theory, including Cetorelli and Gambera (2001) and Beck, Demirgüç-Kunt, and Maksimovic (forthcoming). Cetorelli (2003) uses data for regions in the United States, and Bonaccorsi and Dell'Aricca (forthcoming) use data for local market areas in Italy.

CONCLUSIONS

Antitrust analysis of bank mergers and acquisitions is based on assumptions about the geographic scope of banking markets, the nature of the product or products sold in banking markets, and the relevant competitors within the market areas. The market areas for banking services are assumed to be local: generally, metropolitan areas for cases involving banks in urban areas and counties for cases involving banks in rural areas. The relevant product is a cluster of financial services demanded from commercial banks, rather than individual financial services, such as various types of deposit accounts or types of loans. The relevant competitors are banks and thrifts with offices located in the same market area.

The studies surveyed in this article provide evidence that is consistent with some of the assumptions that underlie banking antitrust. The findings of these studies are consistent with the view that the relevant market areas for banking antitrust are local communities. In addition, the studies continue to yield evidence that banks located in market areas with relatively low concentration tend to offer their financial services at terms that reflect greater competition.

Several of the surveyed studies also provide evidence that is *not* consistent with the current practice of banking antitrust. One such study presents evidence that concentration at both the local and state levels affects the pricing of banking services. A study based on recent data indicates that banking consolidation is diminishing the effect of local market concentration on deposit interest rates. Other studies find evidence that local market concentration is not the only measure of market structure that affects the pricing of banking services. The sizes of the organizations with offices in local areas affect the pricing of banking services, and the degree to which these institutions compete with each other in other markets affects bank profits. In addition, evidence that large banks are lending to small businesses located in areas where the banks do not have offices raises questions about the assumption that local banks are the relevant competitors in banking antitrust analysis. Finally, several studies find evidence that the presence of credit unions in market areas affects how banks price financial services. This evidence brings into question the current practice of rarely including credit union deposits in market concentration calculations.

In conclusion, many of the studies written or

published in recent years have found evidence supporting a number of the assumptions that underlie banking antitrust. The studies also show, however, that the effects of financial innovations and changes in bank regulation are starting to call into question some of the current practices in banking antitrust analysis.

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