Local Bank Office Ownership, Deposit Control, Market Structure, and Economic Growth.

By Robert N. Collender and Sherrill L. Shaffer, Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture. Technical Bulletin No. 1886.

Abstract

The restructuring of commercial banking has heightened interest in its economic consequences both for the economy as a whole and for those most likely to bear adverse consequences: small businesses, small banks, and rural areas. Most previous research on bank restructuring focuses on changes in bank behavior. In contrast, this paper focuses on the empirical association between local economic performance and changes in local bank market regulation and structure. Findings suggest that mergers or acquisitions of local banks by nonlocal banks need not impair local economic growth, and may even have beneficial effects in rural markets, with the possible exception of farm-dependent areas. These findings are derived from empirical models that relate both shortrun and longrun growth in real per capita personal income to geographic restrictions on bank activity, local bank (deposit) market concentration, local or nonlocal ownership of local bank offices, and local or nonlocal control of local bank deposits.

Keywords: Commercial banking, economic growth, geographic liberalization, bank ownership.

Acknowledgments

The authors thank Thomas Carlin, Patrick Sullivan, Jerome Stam, James Monke, James Mikesell, Daniel Milkove, Economic Research Service, USDA, Eldon Smith, University of Kentucky, and R. Alton Gilbert, Federal Reserve Bank of St. Louis, for their valuable comments and suggestions.

1800 M Street
Washington, DC 20036-5831

May 2000

Contents

Summary

Over the last quarter century, the number of chartered banks in the United States has declined by more than one-third. At the same time, the eight largest banks have increased their control of total U.S. bank assets: from 22 percent in 1988 to 36 percent in 1997. This restructuring of U.S. commercial banking has heightened interest in its economic consequences, especially for those businesses and areas most likely to bear adverse consequences: small businesses, small banks, and rural areas. Our analysis suggests that mergers or acquisitions of local banks by nonlocal banks need not impair local economic growth and may even have beneficial effects in rural markets, with the possible exception of farm-dependent areas.

This analysis adds to the growing literature on geographic liberalization of bank regulations, bank ownership structure, and local market concentration. The focus is on the association between economic growth and the structure and location of bank ownership in local markets. Both international and domestic studies have found important positive linkages between financial markets and growth. The research presented here extends this line of inquiry by relating bank market structure and regulatory change to economic growth at the local market level. A central issue is the distribution of previously documented positive relationship between geographic deregulation and State-level growth among metropolitan and nonmetropolitan areas. Other important issues revolve around the impact of bank market concentration, out-of-market (nonlocal) ownership of local bank offices, and out-of-market control of local deposits.

Results generally support the importance of the linkage between geographic liberalization and local growth in the short run. Estimates of this impact in metropolitan markets range as high as 1.2 percent per year or 87 percent of expected growth rates. Nonmetropolitan markets exhibit a smaller but still important impact of 0.84 percent per year or 53 percent of expected growth rates. These results are qualitatively robust to different model specifications. Market concentration and bank ownership structure do not explain the impact of liberalization on local shortrun growth. In addition, statistical tests indicate that local bank market structure has a statistically significant association with local economic growth. However, the location of neither bank office ownership nor deposit control is statistically related to shortrun growth in nonmetropolitan areas. In metropolitan areas, out-of-market ownership of bank offices is associated with lower shortrun growth rates, though the magnitude of this effect is economically small. Results from our longrun model generally support and enrich our shortrun results.

Farm-dependent markets appear to fare less well following geographic liberalization. In these markets, liberalization is associated with a decrease in shortrun growth, and higher initial levels of out-of-market bank ownership are associated with a fall in longrun growth in the 1984 to 1996 period. However, the shortrun result is not robust, and local cycles in the farm economy rather than changes in banking may explain it.

These results are derived from empirical models that relate both shortrun and longrun growth in real per capita personal income to geographic restrictions on bank activity, local bank (deposit) market concentration, in-market or out-of-market ownership of local bank offices, and in-market or out-of-market control of local bank deposits. We estimate separate models for metropolitan, nonmetropolitan, and farm-dependent markets. The latter markets are a subset of nonmetropolitan markets and are of interest because of the historic link between these markets and restrictions on bank branching. We estimate longrun models over two time periods. The first—from 1973-84—largely predates liberalization in nonmetropolitan areas, while the second—from 1984-96—coincides with increasing liberalization of geographic banking restrictions.

Local Bank Office Ownership, Deposit Control, Market Structure, and Economic Growth

Robert N. Collender and Sherrill L. Shaffer

Introduction

Over the last quarter century, commercial banking in the United States has undergone a profound and continuing restructuring. The number of banks has fallen dramatically while the size and complexity of many banking organizations have increased in an equally dramatic fashion (Berger *et al.*, 1995). For example, the number of chartered banks in the United States fell from roughly 14,000 in 1973 to 9,500 in 1996, while the total number of bank offices rose from about 40,000 to 67,000 in the same period. Banking assets have also become more concentrated among bank firms. From 1988-97, the largest eight banking firms increased their share of total bank assets from 22 percent to 36 percent. Banks with less than $100 million in assets (1994 implicit GDP deflator dollars) held 14 percent of bank assets in 1979 but only 7 percent by 1994. During the same period, banks with over $100 billion grew from 10 to 20 percent of total bank assets. These trends have accelerated in the past few years as interstate banking has been phased in. As of yearend 1998, the number of chartered commercial banks had fallen to 8,774 while the number of total bank offices had increased to 70,731.

This restructuring is the result of technological advances, competitive forces, and regulatory and statutory changes. One of the more pervasive regulatory changes has been the wholesale abandonment of geographic restrictions on banking activity. In 1960, 39 States had some kind of limit on intrastate branching, including 19 States that prohibited branching altogether. In addition, 22 States limited the activities of multibank holding companies, which serve as a functional alternative to branching banks. Of these 22 States, 15 prohibited multibank holding companies altogether. Common geographic restrictions limited the number of bank offices (unit banking States) or the geographic scope of any branching (often to the home county). In 1973, over 60 percent of banks (9,200 of 13,964) were unit banks. This proportion decreased to roughly 50 percent by 1984 (7,426 of 14,483) and to 33 percent (3,279 of 9,510) by 1996. In terms of total banking offices, the change is more dramatic. Unit banks represented about 25 percent of all banking offices in 1973, about 15 percent in 1984, and about 5 percent by 1996.

The restructuring of U.S. commercial banking has heightened interest in its economic consequences both for the economy as a whole and for those businesses and areas most likely to bear adverse consequences: small businesses, small banks, and rural areas (see, for example, USDA, 1997; Federal Reserve Bank of Kansas City, 1997). The ongoing consolidation of European banking has raised similar concerns. This report focuses on the rural impact of bank restructuring. Rural areas, especially those traditionally served by unit banks, have a long history of fear, suspicion, and antipathy toward bank consolidation and nonlocal control. Many rural residents and

Robert N. Collender is a senior financial economist at ERS/USDA. Sherrill L. Shaffer is John A. Guthrie, Sr., Distinguished Professor of Banking and Financial Services, Department of Economics and Finance, University of Wyoming. This paper was produced under cooperative agreement number 43-3-AEM-8-80119 between the Economic Research Service and the University of Wyoming.

business people expect the current restructuring to harm their communities despite fairly compelling theoretical and empirical evidence that at least some degree of liberalization provides considerable overall economic benefits. These fears arise in part from northern European agrarian traditions that emphasized the need to limit banking firms. Regardless of the economic merits of these beliefs, they undergird support for restrictions on banking activities and remain politically important.[1]

This report adds to the growing literature on geographic liberalization of bank regulations, bank ownership structure, and local market concentration. The focus of this literature is on the association between various measures of economic growth and the structure and location of bank ownership in local markets. This report represents a first attempt to examine empirically the association between economic growth, as measured by real per capita income growth rates, and out-of-market bank ownership and local bank market concentration across local banking markets (defined as metropolitan statistical areas or nonmetropolitan, rural counties).[2] In examining these linkages, we control for the nature of the local economy, *ex ante* bank ownership structure and market concentration, and coevolution of bank structure and market concentration. We investigate possible omitted variables and reverse causality as well.

The report proceeds as follows. The next section discusses some of the reasons why locally owned banks may behave differently from nonlocally owned banks, especially in economically small areas. The following section reviews the literature on the most controversial aspects of liberalizing geographic restrictions on commercial banking and the impact on rural areas. It also reviews the results of the relatively new literature relating financial factors to general economic performance. Subsequent sections present our empirical model, data considerations, and results. Finally, we discuss the conclusions from this work and avenues for fruitful further research.

[1]For example, Texas and Montana opted out of interstate branching and Colorado considered doing so as authorized in the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994. However, the Office of the Comptroller of the Currency (OCC, regulator of national banks) ruled that opting out does not prevent nationally chartered (as opposed to State-chartered) banks from branching across State lines. This ruling caused the Texas Commissioner of Banking to nullify rules prohibiting interstate branching since they put State-chartered banks at a competitive disadvantage.

[2]Employment growth is a prominent alternative measure of economic growth that occurs in the development literature. For expositional tractability, we focus this report on income growth, deferring an investigation of the relationship between employment growth and bank market structure for subsequent research.

Why Local Banks Might Be Different

Small, local banks may behave differently from larger and nonlocal banks for a variety of reasons, including superior access to local information, greater commitment to local prosperity, and differences in technology (cost structure) or risk management related to bank size. Under regulations limiting the geographic span of bank activity, local banks may behave differently both because they have some protection from competition and because their lending options are limited. Some of these factors are more a function of bank size, while others depend on whether the bank's charter limits its geographical range of operation. In either case, they have implications for the behavior of small, local banks.

Superior Access to Local Information. Many bank loan customers, especially small businesses, are informationally opaque—that is, their financial conditions are not easy to assess or monitor. Researchers have long characterized bank lending as information intensive, relying on essentially privately developed data and analysis (Leland and Pyle, 1977; Diamond, 1984) to assess loan requests and to monitor borrowers' financial conditions and their adherence to loan terms. The intensity of initial information gathering and subsequent monitoring implies that the location of a bank's offices relative to its borrowers may be important because the costs of these activities increase with distance. Deposit and transactions accounts can also provide low-cost financial data valuable for assessing loan requests and monitoring loan customers (Black, 1975; Berger, 1999). Since deposit relations are largely local, they strengthen the likelihood that locally active banks will have an information advantage over other lenders in serving these informationally opaque borrowers.

Greater Commitment to Local Prosperity. One premise of geographic restrictions on bank activity is that tying the fortunes of banks and bank managers to specific locations will increase their commitment to achieving local economic prosperity. Calomiris (1993) argued that established middle-class agricultural interests have historically favored entry restrictions because such restrictions create location-specific bank capital that impedes the shifting of bank lending to more lucrative locations in the short run. An essential factor in this support is the location-specific nature of agricultural wealth in land. Greater stability of local loan capital provides some measure of loan and, therefore, wealth insurance. Location-specific wealth is protected since the location-specific bank charters induce continued lending in an area even on reduced collateral values, limiting to some extent downward movements in property values. Since creditworthiness relies on wealth and wealth can depend, at times, on the continued availability of loans, location-specific banks provide a safety net in the short run, even though in the long run they may prove unable to survive occasional severe market-wide shocks.

Differences in Technology, Costs, and Risk Management. While geographic restrictions may tie banks to local prosperity, these restrictions may also affect bank behavior. Both theoretical and empirical evidence suggests that small, independent banks, branching banks, and holding company affiliates use different technologies and face different costs related to lending, funding, general operations, and risk management. Such differences are likely to be most substantial in the smaller, less diversified economies that prevail in rural areas.

With respect to lending technology, researchers have presented evidence that "relationship lending" is more prevalent at smaller banks while "transactions-based" lending dominates larger banks (Haynes *et al.*, 1999; Cole *et al.*, 1999). Relationship lending relies on privately developed information often accumulated from a variety of sources including financial relationships outside the loan contract. Transactions-based lending relies on more easily obtained information such as financial statements and collateral quality when the loan application is processed. Relationship lending depends on detailed knowledge of a business, its owner's character and reputation, and its local market. Relationship-based lenders develop this information over an extended period through several avenues. In contrast, transaction-based lending is often collateral-based, relies on nonrecurring collection of readily available and verifiable information, and relies on statistical underwriting based on large numbers of similar loans. Berger (1999) argued that both scope and scale diseconomies may discourage larger, more complex banks from engaging in relationship lending. Such diseconomies may arise from agency costs in monitoring the information generated

by local loan officers and managerial difficulties of producing outputs that require implementation of different policies and procedures. In contrast, small banks may face competitive disadvantages in transactions-based lending. Economies of scale arise from the statistical basis for such lending, and agency problems can hamper sales of loans into secondary markets by small lenders[3]—an important source of funding for such loans.[4]

The costs of establishing and operating small, independent banks may be higher than those of either same-size bank branches or affiliates of bank holding companies (BHC's). Branches and BHC affiliates share some of their fixed costs with a larger asset base. Larger branching banks and holding company affiliates can also share resources at the company level, potentially increasing the returns to specialized human capital. In theory, such cost advantages would allow branches and holding company affiliates to provide services in remote areas. Empirical evidence with respect to the dispersion of bank offices is consistent with such cost advantages (Calomiris and Shweikart, 1988; Evanoff, 1988; Gunther, 1997).

Compared with larger banks, small banks are much more likely to rely on deposits to fund loans and much less likely to use nonlocal, nondeposit funds (USDA, 1997; Barry and Associates, 1995). This reliance on local deposits reflects, in part, agency problems faced by small banks. Correspondent banks are, at times, unwilling to accept loans originated by small banks as collateral or may be reluctant to extend liquidity to small banks during periods of tight monetary policy. Kashyap and Stein (forthcoming) argue that small banks are often more vulnerable to contractions in the money supply through the drying up of free reserves than are larger banks with direct access to commercial paper markets. Economic theory and empirical evidence also suggest that the ability of small banks to raise deposits may constrain their lending activity. This constraint may help explain the lower proportion of assets held in loans and the greater proportion held in securities by small banks (Morgan, 1998; Houston and James, 1998).

Risk management is closely linked with liquidity management. Banks that operate in relatively small and economically homogeneous geographic areas cannot easily diversify the credit risks in their loan portfolios. To compensate for this inability to diversify, small banks on average hold more equity capital and liquid assets than larger banks. The following section discusses evidence on the impact of geographic liberalization on bank behavior in more detail.

Protection from Competition. Some protection from competition was an explicit part of geographic limits on banking activity, and empirical evidence indicates such protection affects bank behavior. The historical roots of limits to bank branching in the United States lie in the mercantilist traditions of European colonialism. A cornerstone of this system was the exchange of monopoly privileges for advantages to the government. In the United States, State governments granted bank charters that included both limited liability and the right to issue money in return for revenue or other fiscal advantages. U.S. bank-chartering systems helped finance their governments through taxes, direct government ownership of banks, or forcing banks to hold government liabilities. After the constitutional ban on issuing fiat money and taxing interstate commerce, many States derived a significant share of their revenue from banking, and in some States banks were the main source of revenue (Sylla *et al.*, 1987; Calomiris, 1993). The importance of banking as a source of revenue aligned the interests of State governments with those of established State-chartered banks with respect to limiting competition among banks and prohibiting operations by banks chartered in other States. Researchers have found that banks operating in protected markets are more likely to charge higher rates on loans, pay lower rates on deposits, and be inefficient. These results are discussed in more detail in the next section.

[3]Agency problems arise when a decisionmaker acts as an agent for another and their interests diverge. In the case of a bank selling loans into the secondary market, the bank acts as an agent for investors who buy the loans. However, the interests of the bank and the investors may be at odds. For example, the bank, which has superior information about loan quality, may wish to sell low-quality loans, while investors wish to purchase high-quality loans. Thus, investors must rely on monitoring or reputation as indicators of loan quality or forgo purchasing loans from banks lacking a solid reputation.

[4]However, Freddie Mac, Farmer Mac, ABN Amro, and GNMA securitize some types of generally well collateralized or documented loans bundled across multiple lenders, including small lenders.

Geographic Liberalization, Consolidation, and Bank Behavior

A large body of literature has examined the impact of restructuring on a variety of measures of bank performance (see, for example, the survey by Berger *et al.*, 1999). With successive liberalizations of geographic restrictions and the increased consolidation of commercial banking, researchers have focused on the relationship between the geographic span of bank activity and various measures of bank performance. Areas of such research include lending quantity and quality, operating efficiency, loan and deposit pricing, bank risk management (loan portfolio diversification), and the competitiveness of various industry segments—especially nonlocal and small community banks. Here, we review the portion of this literature that directly addresses the most prevalent rural concerns: bank exercise of market power, lending to small business and agriculture, and small bank competitiveness.

Market Power Consequences of Consolidation. The potential of banks to exercise market power is of particular concern to rural areas since rural banking markets are on average significantly more concentrated than urban markets. Survey evidence indicates that households and small businesses overwhelmingly rely on financial institutions with a local physical presence. The physical barriers (e.g., distance) and economic barriers (e.g., limited overall market size) to effective competition in many rural areas are considerably greater than in urban areas. Consolidation between banks operating in the same geographic areas increases local concentration, while that involving institutions with mutually exclusive territories is unlikely to affect local concentration directly.

Research indicates some cause for continuing concern. Some previous empirical research has found adverse and statistically significant associations between local market concentration and rates paid on deposits or charged on small business loans (Berger and Hannan, 1989, 1997; Hannan, 1991). However, other studies have found mixed or contrasting results (Petersen and Rajan, 1995), while a theoretical analysis of adverse selection demonstrates how loan rates may decline with market concentration (Shaffer, 1999).

In addition, the dynamic behavior of bank deposit rates in more concentrated markets has been consistent with the exercise of market power. In concentrated markets, bank deposit rates have generally been slower to respond to changes in open market interest rates than in less concentrated markets. Under neoclassical assumptions, such stickiness should not persist in a competitive market. Also consistent with the exercise of market power, this observed stickiness in deposit rates was greater as rates rose than as they fell (Hannan and Berger, 1991; Neumark and Sharpe, 1992; Hannan, 1994; Jackson, 1997).

Finally, Prager and Hannan (1999) directly investigated the impact of merger activity on pricing. They found that banks involved in mergers that violate Department of Justice safe harbor guidelines (a Herfindahl-Hirschman Index (HHI) over 1800 or increase over 200) reduced rates they paid on deposits after the merger.[5]

Despite this association between local measures of concentration and prices, some evidence points to a decrease in market power over time. *A priori*, one would expect that markets for banking services are increasingly contestable, in part, because the removal of geographic restrictions lowers barriers to entry in local markets. New delivery alternatives and changes in consumer behavior (ATM's, telephone banking, internet banking, and increased use of credit and debit cards) also increase the geographic span of bank activities. Although the association between local concentration and rates on small business loans remains robust (Cyrnak and Hannan, 1998), that between local concentration and deposit rates has apparently weakened (Hannan, 1997; Radecki, 1998). Bank fees on retail deposits and payment services show little relationship to local market concentration in the 1990's, consistent with low market power (Hannan, 1998).

Consolidation and the Availability of Services To Small Business and Agriculture. The fact that rural businesses tend to be small and to rely on local banks might suggest that bank consolidation could reduce the credit available to small businesses. For example, many researchers have noted that large banks lend proportionally less assets to small businesses than to large (Berger *et al.*, 1995, Keeton, 1995; Levonian and Soller, 1995; Berger and Udell, 1996; Peek and Rosengren, 1996; Strahan and Weston, 1996; Cole *et al.*, 1999). For various reasons, small banks cannot make large business loans or provide other services attractive to larger businesses. They lack sufficient

[5]The HHI is the sum of squared market shares of all market participants times 10,000.

scale to do so efficiently, they cannot diversify risks effectively, and they are subject to strict legal lending limits relative to their modest equity capital. Similarly, larger institutions may have a comparative disadvantage in serving some types of small customers since diseconomies may exist in mixing retail and wholesale services (Berger and Udell, 1996; Cole *et al.*, 1999). They may be inefficient at providing relationship-based services as opposed to high-tech, transactions-based services. More complex banking organizations (e.g., multibank, multistate holding companies) may find serving small customers inefficient when multiple layers of management are involved. As banks achieve sufficient size, they may shift focus away from small customers as they choose to deliver more lucrative services to larger customers.

However, even if these observations are valid, countervailing forces imply that consolidation is not always bad for small borrowers, and empirical evidence indicates little cause for concern except for transitional disruptions. While consolidations of large organizations often reduce small business lending, several researchers (Walraven, 1997; Peek and Rosengren, 1999; Strahan and Weston, 1996) point out that the majority of consolidations involving small banks increase rather than decrease small business lending. Among smaller banking organizations, managers tend to allocate more of their total assets to loans and tend to make more small business loans. In rural areas, mergers among small and medium-sized banking organizations have been more prevalent than in metropolitan areas, mitigating the adverse impact of consolidation on rural farms and small businesses.

Bank consolidation can also improve services to small customers during economic downturns, since large, complex banks are likely to be better diversified (Calomiris, 1993; Gilbert and Belongia, 1988; Laderman *et al.*, 1991, Hancock and Wilcox, 1998). Large banks or multibank holding companies may also operate efficient internal capital markets that allocate funds to the most profitable loan markets relatively unconstrained by local deposits (Houston *et al.*, 1997; Houston and James, 1998). Kashyap and Stein (forthcoming) argue that small banks are particularly hampered by adverse selection problems associated with raising external funds and that changes in monetary policy matter most for lending by small banks with the least liquid balance sheets. They argue that significant benefits may accrue from consolidating small banks into an organization that internally coordinates capital flows.

Several researchers have focused specifically on the effects of consolidation or geographic liberalizations on lending to agriculture. Laderman *et al.* (1991) found that, after introduction of statewide branching, rural banks decreased (but urban banks increased) their share of agricultural loans. Bank asset diversification benefits agriculture by reducing credit disruption from bank failure. Their evidence is also consistent with increased efficiency of bank equity capital. When banks efficiently diversify assets, their equity capital can safely support higher loan-to-asset ratios and higher asset-to-capital ratios. Laderman *et al.* make no statement on the net effect on agricultural lending, but their results are generally consistent with those of Gilbert and Belongia (1988), who found that an increase in acquisitions by large banking organizations (assets greater than $1 billion) reduces the supply of agricultural credit through commercial banks. They attribute the difference in behavior between large and small banks to diversification constraints faced by small banks, consistent with the results of Calomiris, Hubbard, and Stock (1986). None of these studies considered the reactions of other lenders to any adjustments by consolidating commercial banks.

The effects of consolidation on the behavior of other small business lenders can also be important. Overall, the direct effect of bank consolidation appears to reduce small business lending because large banks dominate the volume of merged assets but not the numbers of mergers. However, secondary effects appear to offset much, if not all, of the adverse direct effect (Berger *et al.*, 1998). De novo (newly chartered) banks are spawned in larger numbers in the wake of consolidations and tend to lend a greater percentage of their assets to small businesses than do other comparable small banks. This effect persists for years (Goldberg and White 1998; DeYoung, 1998; DeYoung *et al.*, 1999). Berger *et al.* (1999) suggest that the evidence is consistent with the possibility that the number of small banks in a market may be determined by local demand for small business services.

If indeed small businesses depend on financial institutions with a local physical presence, then the impact of consolidation on branch office availability could also be important. Research on this subject is somewhat mixed with respect to rural access. Avery *et al.* (1999) found that mergers within the same ZIP codes reduce the number of branches per capita, but other mergers have little effect. Evanoff (1988) found that limited branching enhanced access to bank services in rural counties but that statewide branching did not

beyond that associated with unit banking. Both limited and statewide branching boost service in metropolitan areas. However, Gunther (1997) found that many types of geographic liberalization were associated with relatively strong growth in the number of bank offices serving rural areas during the 1980's. Effective liberalizations included moves from unit to limited branching, from limited branching to statewide branching, and from banning bank holding companies to allowing limited bank holding company activity.

Small Bank Competitiveness. If small banks are not fully competitive with large banks, then the larger banks could enjoy greater ability to exercise market power in smaller rural banking markets and consumer welfare could suffer. A loss of local control could also result in an outflow of local savings to large metropolitan centers except as limited by the Community Reinvestment Act (CRA), with small businesses facing reduced access to financial services. While the empirical literature finds little evidence of reduced competition, some evidence suggests potentially significant competitive advantages for larger banks.

No compelling evidence yet exists that geographic liberalization leads to reduced local competition. Savage (1993) found no significant increase in local concentration due to relaxation of branch restrictions. Thomas (1991) found that interstate branching increased the rate at which new local banks were chartered in Florida. Calem and Nakamura (1995) found that branch banking in metropolitan areas enhanced competition in outlying areas without reducing it in urban centers. Berger *et al.* (1999) presented evidence that average market concentration has fallen in both metropolitan and nonmetropolitan markets since 1988.

Whalen (1995) focused on the competitiveness of local and nonlocal banks in financing small businesses. He found that the proportion of small business lending at banks affiliated with out-of-State holding companies compares favorably to that at both independent banks and in-State holding company affiliates. While out-of-State affiliates generally charged less for small business loans in his sample, their marginal costs were higher. Thus, independent local banks are not at a competitive disadvantage in the market for small business lending, enjoying both lower marginal costs and higher margins than either in-State or out-of-State bank holding company affiliates. However, DeYoung *et al.* (1997) found that, after an initial adjustment period, out-of-State entry ultimately improved cost efficiency at small, local banks in metropolitan areas, enhanced competition, and led to substantial gains in market efficiency.

Recent research on the efficiency consequences of consolidation generally indicates that large banking organizations may derive competitive advantages from two sources: scale and diversification. These results contrast with earlier research that indicated few competitive advantages for banks based on asset size (Clark, 1996; Berger and Humphrey, 1991), scope of activities (Berger *et al.* 1987; Ferrier *et al.*, 1993), or diversification (Rose and Wolken, 1990; Goldberg and Hanweck, 1988).

Berger and Mester (1997) estimated significant economies of scale (up to about 20 percent of costs) for banks with up to $25 billion in assets. They suggested that the presence of such large potential cost savings in contrast to earlier negative findings could arise from lower open market interest rates, technological progress, or regulatory changes such as geographic liberalization. McAllister and McManus (1993) found scale efficiencies from diversification for banks up to $1 billion in assets. Hughes *et al.* (1999) found that when size increased in a way that brings geographic diversification—for example, through interstate banking—efficiency tended to be higher and insolvency risk tended to be lower.

The Finance Sector and Economic Growth

We argue in this paper that a better indicator of the economic impact on local markets of liberalization and consolidation is their overall impact on economic growth. Such indicators as changes in the quantity of lending, pricing, or bank competitiveness are limited measures of efficiency because of the strong likelihood that the starting points themselves were inefficient. For example, an increase in small business lending following geographic liberalization may be consistent with either an efficiency gain or an efficiency loss. A gain might arise if preexisting geographic restrictions induced conservative lending policies to compensate for inefficient diversification or allowed a local bank to exercise market power. Conversely, a loss might occur if funding expands for projects with high risk or negative expected net present value (Broecker, 1990; Shaffer, 1998). Therefore, while direct measures of loan volume and pricing can provide valuable indicators of winners and losers from liberalization, it is not clear that they

provide information about whether the result is economically efficient or socially desirable.

The literature on the nexus between finance and growth is the primary intellectual inspiration for the current report. We provide empirical evidence concerning the relationship of longrun economic growth to *ex ante* measures of local banking structure and ownership in both metropolitan areas and rural counties within the United States.

In recent years, researchers have found increasing support for the hypothesis that financial development precedes and facilitates economic growth. Using data for 80 countries from 1960-89, King and Levine (1993a) presented cross-country evidence consistent with Schumpeter's view that financial systems can promote longrun growth. They found the predetermined component of financial development to be robustly correlated with future rates of economic growth for three alternative measures of economic growth: real per capita GDP, the rate of physical capital accumulation, and improvements in efficiency of physical capital use. King and Levine (1993b) explored the mechanisms through which financial systems affect economic growth. They suggested that financial sector distortions reduce growth by reducing the rate of innovation and presented evidence consistent with the hypothesis that financial systems are important in spurring productivity growth and economic development. Levine (1998) examined the relationship between the legal system, banking, and economic development. Countries with legal systems that emphasize creditor rights and rigorously enforce contracts have better developed banks than countries where laws do not give priority to creditors and where enforcement is lax. Again, he found the exogenous component of banking development to be correlated positively and robustly with measures of economic growth. Levine and Zervos (1998) found that stock market liquidity and banking development both predict growth, capital accumulation, and productivity improvements. Their results are robust after controlling for economic and political factors. Their evidence is consistent with the view that financial markets provide important services for growth and that stock markets and banks provide different services. Rajan and Zingales (1998) showed that firms that are more dependent on external finance grow faster in countries with better-developed financial sectors. They suggested that by reducing the cost of external finance for such firms, financial development plays an important, beneficial role in the rise of new firms.

These papers all explored the relationship between financial development and economic development in the context of national economies. In contrast, Jayaratne and Strahan (1996) explored the relationship between the banking sector and economic growth in the context of the liberalization of branching restrictions by U.S. States. They provided evidence that real per capita growth rates, of both personal income and gross State product, increase significantly following intrastate branching reforms. They also checked the robustness of their results to affirm that changes in growth rates resulted from changes in the banking system.

Testing for Associations Between Local Growth and Banking

Models and Hypotheses

The growth literature indicates that financial institutions and policies are closely associated with State and national growth rates. Here, we estimate empirical models to test whether these relationships extend to the local market level. In particular, we explore the relationship between economic growth rates in local markets and geographic liberalization, market structure, and bank ownership structure using empirical models based on those that have already appeared in the finance and growth literature. We also test for differences in these relationships in metropolitan and nonmetropolitan areas.

As indicated in the above review of the literature, several factors suggest that nonmetropolitan areas could fare differently from metropolitan areas when geographic constraints on bank activity are lifted. For example, Calomiris (1993) provided historical evidence that efficiency costs imposed on local economies by limits on branching may be greater in rural areas. Bank-dependent borrowers in rural areas have faced high external finance costs due to scarce bank capital, cyclical and seasonal credit contractions, and additional costs when local banks failed because of inefficiently diversified portfolios. However, countervailing benefits to at least some rural interests may accompany geographic restrictions. Calomiris cited "loan" and "wealth" insurance. Recent research suggests the impact of market concentration may be ambiguous if it arises from competitive advantages in contestable markets, or if the "winner's curse" effect is sufficiently large. Moreover, loss of local control and a reduced commitment to local growth could lead to a reduction in relationship-based lending that is important to the creditworthiness and viability of relatively opaque small businesses.

We investigate hypotheses concerning the economic growth benefits associated with changes in bank ownership and bank market structure and their relation to metropolitan and nonmetropolitan markets. The empirical work that follows resembles other work in the finance and growth literature. Following first Jayaratne and Strahan (1996—hereafter J&S), we model the local growth impacts of changes in geographic regulations. We extend this model to consider the impacts of the location of bank office ownership (in-market or out-of-market) and the location of control of local bank deposits. Then, following King and Levine (1993a and 1993b) and others, we model the average longrun annual growth rates as a function of both *ex ante* and contemporaneous measures of financial structure and a series of control variables.

Local Economic Growth and Geographic Deregulation. J&S present a simple fixed-effect model to test the impact of geographic deregulation on State-level economic growth:

$$(1) \qquad Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma DMA_{t,i} + e_{t,i}.$$

where $Y_{t,i}$ equals real, per capita, personal income during year t in local market i, $DMA_{t,i}$ is a binary variable equal to 1 for markets in States that allow unrestricted branching through mergers and acquisitions in year t, and $e_{t,i}$ is an error term with the usual properties. As in J&S, β_1 represents the cross-section-specific—or local market—component of longrun economic growth; α_1 represents the common, economywide shock to growth at time t; and γ represents the increase in per capita economic growth stemming from deregulation of branching through mergers and acquisitions. We test the hypothesis that geographic liberalization has no relationship to annual economic growth (H1a: $\gamma = 0$) in separate regressions of metropolitan and nonmetropolitan markets.

Local Economic Growth and Bank Market Structure, Bank Ownership, and Deposit Control. To isolate the impact of changes that may be associated with geographic liberalization, we augment J&S's basic model in two stages. First, we add a variable to control for local bank market concentration, the Herfindahl-Hirschman index of bank deposits (HHI), which is the sum of squared market shares for all market participants,

$$(2) \qquad Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma DMA_{t,i} + \delta HHI + e_{t,i},$$

to test whether market concentration is related to growth (H2b: $\delta = 0$) and whether that relationship vitiates any relationship between liberalization and growth (H2a: $\gamma = 0$).

Next, we control for in-market and out-of-market ownership of bank offices and control of bank deposits. More specifically, we add the number of in-market owned bank offices (NIB), the number of out-of-market owned bank offices (NXB), the inflation-

adjusted amount of local deposits controlled by in-market owned banks (IDEPS), and the inflation-adjusted amount of local deposits controlled by out-of-market owned banks (XDEPS). These variables allow us to distinguish whether the relationship between local growth and out-of-market control of banking activity, rather than other activities related to ownership of local bank offices, is specifically related to deposit control. The estimated equation is thus:

$$(3) \quad Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \gamma_2 DNOVO_{t,i} + \delta_1 HHI_{t,i} + \delta_2 NIB_{t,i} + \delta_3 NXB_{t,i} + \delta_4 IDEPS_{t,i} + \delta_5 XDEPS_{t,i} + e_{t,i},$$

where *DNOVO* is a binary variable equal to one for markets in States that allow unrestricted *de novo* branching in year *t*. This latter variable helps account for the process of geographic liberalization in more detail. As documented by Amel (no date), geographic deregulation has typically occurred in two stages. In the first stage, multibank holding companies (MBHC's) may convert subsidiary banks into branches and may expand geographically through acquisition and conversion of existing banks. In the second stage, banks are allowed to expand geographically by establishing new (*de novo*) branches anywhere in the State. Adding *DNOVO* to the empirical model allows us to test the additional impact of the second stage of deregulation on metropolitan and nonmetropolitan growth. *NIB, NXB, IDEPS*, and *XDEPS* provide information on the impact of nonlocal ownership of bank offices and control of deposits.

This specification allows testing of hypotheses relating local economic growth to geographic liberalization, local market growth, and the loci of bank office ownership and of control of local deposits (in-market and out-of-market). First, we test for a statistically significant relationship between our explanatory variables and local economic growth, both jointly and individually:

H3a: Shortrun, local economic growth is independent of bank deposit market concentration, the distribution of nonlocal and local bank office ownership, and the distribution of nonlocal and local control of local deposits ($\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$, j= metropolitan or nonmetropolitan).

H3b: Local growth is independent of bank deposit market concentration ($\delta_{1,j} = 0$).

H3c: Local growth is independent of the number of local bank offices ($\delta_{2,j} = \delta_{3,j} = 0$).

H3d: Local growth is independent of the quantity of local deposits ($\delta_{4,j} = \delta_{5,j} = 0$).

Then, we test whether the coefficients on each pair of variables related to local and nonlocal control are the same. That is, we test whether the relationship of growth to nonlocally owned offices or nonlocally owned deposits is the same as the relationship of growth to locally owned bank offices or locally owned deposits.

H3e: The locus of local bank office ownership (in-market or out-of-market) is irrelevant to local growth ($\delta_{2,j} = \delta_{3,j}$).

H3f: The locus of control of local bank deposits (in-market or out-of-market) is irrelevant to local growth ($\delta_{4,j} = \delta_{5,j}$).

The results of the hypotheses tests directly address the concerns of nonmetropolitan areas regarding the potentially negative impact of loss of local control over bank capital and deposits. Results concerning the relationship of growth to the number of bank offices also add to the literature on geographic liberalization and access to bank services (Calomiris and Schweikart, 1988; Evanoff, 1988; Gunther, 1997).

Longrun Local Economic Growth and Market Structure, Ownership, and Deposit Control. King and Levine estimate the relationship between national growth rates and both contemporaneous and initial values of financial and other variables. Following this literature, we estimate a model with both contemporaneous and initial values of bank market variables:

$$\overline{GY}_{t_T,t_0} = \alpha + \beta_1 NIB_{t_0} + \beta_2 NXB_{t_0} + \beta_3 XTB_{t_0} + \beta_4 DIB_{t_T,t_0} + \beta_5 DXB_{t_T,t_0} + \beta_6 DDEP_{t_T,t_0} + \gamma_1 DPC_{t_0} + \gamma_2 LEDU_{t_0} + \gamma_3 LPOP_{t_0} + \gamma_4 LRPCPI_{t_0} + \gamma_5 HHI_{t_0} + e,$$

where $GY_{t_T t_0}$ is the geometric mean of the annual growth rates from the initial time, t_0 , to the end of the period, t_T , and initial variables are defined as in table 1.

This model affords insight into an important set of unexplored issues—the longrun linkage between bank concentration and ownership structure versus growth rates in income. The empirical tests below distinguish the effects on growth of the raw number of bank offices; of the market concentration of banks; and of the mix between locally owned and remotely

owned bank offices. By estimating the model for different time periods, we can also examine the stability of the linkages over time. Our measures of market structure and ownership include the market-wide Herfindahl-Hirschman index (HHI) of deposits that is commonly used in empirical banking research and by Federal regulators in assessing the degree of banking competition; numbers of offices of banks headquartered in the market at the beginning of the sample period (NIB); numbers of local branches of banks headquartered outside the market at the beginning of the sample period (NXB); the ratio of remotely owned to locally owned bank offices at the beginning of the sample period (XTB); the growth rate in the number of locally owned bank offices during the sample period (DIB); and the growth rate in the num-

Table 1—Variables used and their sources

Variable	Description
DMA	Binary variable equal to 1 if market entry allowed through mergers and acquisitions. *Source: Amel, no date.*
DNOVO	Binary variable equal to 1 if market entry allowed through establishing new branches. *Source: Amel, no date.*
NIB	Initial number of in-market owned bank offices. *Source: FDIC Summary of Deposits.*
NXB	Initial number of out-of-market owned bank offices. *Source: FDIC Summary of Deposits.*
IDEPS	Initial amount of deposits controlled by in-market owned banks. *Source: FDIC Summary of Deposits.*
XDEPS	Initial amount of deposits controlled by out-of-market owned banks. *Source: FDIC Summary of Deposits.*
XTB	Initial ratio of out-of-market owned bank offices to total bank offices. Note: This ratio is undefined for markets with 0 bank offices. For these markets, we set XTB equal to 1 under the presumption that such markets are more like those whose banks are controlled outside the local market than those whose banks are controlled in-market. *Computed from FDIC Summary of Deposits.*
DIB	Ratio of the number of in-market owned bank offices at beginning of period to that at end of period. Note: This ratio is undefined for markets with 0 in-market owned bank offices in the base year. For these markets, we set the initial level equal to 0.01. *Computed from FDIC Summary of Deposits.*
DXB	Ratio of the number of out-of-market owned bank offices at beginning of period to that at end of period. Note: This ratio is undefined for markets with 0 out-of-market owned bank offices in the base year. For these markets, we set the initial level equal to 0.01. *Computed from FDIC Summary of Deposits.*
DDEP	Change in the ratio of deposits held at out-of-market owned bank offices to total deposits at bank offices from beginning of period to end of period. Note: This ratio is undefined for markets with 0 deposits in bank offices in the base year. For these markets, we set the initial level equal to 0. If, for example, the market has no deposits in bank offices in either the initial or final year, then DDEP is set to 0. *Computed from FDIC Summary of Deposits.*
DPC	Initial level of deposits per capita held at all bank offices in market. *Computed from FDIC and BEA data.*
LEDU	Log of the percent of total adult population with at least 4 years of college at the beginning of the decade in which t_0 falls. *Source: U.S. Census 1970, 1980.*
LPOP	Log of market population (in millions). *Source: BEA*
LRPCPI	Log of real per capita disposable income (in thousands) in market. *Source: BEA*
HHI	Initial market (MSA or rural county) level Herfindahl-Hirschman Index (divided by 10,000) computed with banks consolidated to the holding company level. Note: For markets with zero banks, this is set equal to 1 under the presumption that consumers in these markets will have no more choices than those in markets served by only one bank. *Computed from FDIC Summary of Deposits.*
Nonmetro county typologies: *Source: Economic Research Service/USDA computation based on BEA data.*	
FM	Farming-dependent, 1989 (farm income averages more than 20% of total income from 1987-89)
MI	Mining-dependent, 1989 (mining income averages more than 15% of total from 1987-89)

ber of remotely owned bank offices during the sample period (DXB). These variables permit a decomposition of the effects of raw numbers of bank offices, relative sizes of banks, local versus remote bank ownership, and trends in each of these factors. The locus of ownership is potentially relevant to credit patterns because many multi-market banks centralize their lending decisions for larger loans, making the final decision outside the borrower's market.

The model also includes a vector of control variables as follows. Deposits per capita as of the initial year of the regression period (DPC) controls for the relative supply of funds and intensity of intermediation in the market, similar to King and Levine (1993b). The change in the ratio of deposits in nonlocally owned branches to deposits in locally owned banks over the sample period (DDEP) controls for any shift in the aggregate market share of remotely owned banks, though we do not attach a causal interpretation to this variable because it will reflect any structural response by the banking industry to contemporaneous local economic conditions and trends. The log of the local market population (LPOP) and the log of the real per capita personal income (LRPCPI), both as of the first year of the regression period, control for market size. The log of the percentage of total adult population having completed at least 4 years of college (LEDU) as of 1970—or, for the later regressions, 1980—controls for the average level of education, a proxy for human capital and work force quality. In the rural regressions, USDA county typology dummies are included for farming-dependent (FM) and mining-dependent (MI) counties, measured as of 1989 (see Cook and Mizer, 1994, for further details). Although other typologies are also assigned to counties by the USDA, systemic shocks to agriculture and mining during the 1980's made it essential to control for these two characteristics in particular. Separate regressions were fitted for rural counties alone and for MSA's alone.

We therefore test the following hypotheses, analogous to those tested with model 3:

H4a: Longrun average growth rates of local real per capita personal income are independent of measures of initial local bank market structure ($\beta_{1,j} = \beta_{2,j} = \beta_{3,j} = \gamma_{5,j} = 0$, j= metropolitan or nonmetropolitan).

H4b: Longrun average growth rates of local real per capita income are independent of initial local bank deposit market concentration ($\gamma_{5,j} = 0$).

H4c: Longrun average growth rates of local real per capita income are independent of the initial number of local bank offices ($\beta_{1,j} = \beta_{2,j} = 0$).

H4d: Longrun average growth rates of local real per capita income are independent of the initial percentage of out-of-market ownership of bank offices ($\beta_{3,j} = 0$).

H4e: Longrun average growth rates of local real per capita income are independent of the initial levels of in-market or out-of-market ownership of local bank offices ($\beta_{1,j} = \beta_{2,j}$).

H4f: Longrun average growth rates of local real per capita income are independent of contemporaneous changes in the locus of ownership of local bank offices ($\beta_{4,j} = \beta_{5,j}$).

H4g: Longrun average growth rates of local real per capita income are independent of any contemporaneous shift in the locus (in-market or out-of-market) of control of local bank deposits ($\beta_{6,j} = 0$).

Estimation and Data Information

To estimate the above models, we use data from three primary sources: the Federal Deposit Insurance Corporation's Summary of Deposits data, the Bureau of Economic Analysis's county-level estimates of income and population, and the Bureau of the Census's data on educational attainment. Table 1 lists the variables and their sources.

In keeping with conventional practice in bank structure research, as well as in regulatory policy analysis, we define local markets as metropolitan statistical areas (MSA's) or nonmetropolitan counties (see Whitehead, 1990; Jackson, 1992). Different agencies define U.S. counties somewhat differently because of anomalies among States and changes over time. We ensure consistency across data sets and over time by imposing the following standards on the data. We define urban banking markets based on 1993 definitions of MSA's and hold this definition constant over the sample period to abstract from local changes over time. Rural banking markets are defined as counties not included in MSA's. For consistency with previous research, we exclude Alaska and Hawaii from our shortrun models but not our longrun model. We aggregate each of Virginia's independent cities with the county that surrounds them, and aggregate certain counties in Montana and Wisconsin for which treatment is not uniform across agencies. This process

yields 2,258 (2,270 for the longrun model) rural banking markets and 267 (269) urban banking markets comprising 827 (829) urban counties. We use data from years 1981-96 to estimate our shortrun models and from 1973, 1984, and 1996 for our longrun model.

To fulfill its obligations under the Community Reinvestment Act, the FDIC collects information on the amount of deposits collected by each bank office operating in the United States at the end of the second quarter each year and publishes this information in its annual Summary of Deposits report. From this information, we derive the number of local bank offices owned and the amount of local deposits controlled by banking firms headquartered within and outside each local banking market. From the deposit information, we compute the HHI to measure market concentration. For our longrun model, this information is used to compute contemporaneous changes in in-market and out-of-market ownership of bank offices and control of bank deposits over time. These measures of in-market and out-of-market ownership or control are all based on the location of a bank's headquarters office at the bank charter level, not at the holding company level. We eliminate banks with nonpositive aggregate deposits across all offices, but include offices that report zero deposits at the county level.

Per capita personal income is calculated from Bureau of Economic Analysis estimates of county populations and personal incomes adjusted for inflation using the national consumer price index. To control for educational attainment, we use data from the Bureau of the Census on the percentage of adult population in each county with at least 4 years of college at the start of the relevant decade. For rural counties, we use U.S. Department of Agriculture's county typology to control for certain types of local economies that were most likely to experience dramatic shocks during the study period: farming-dependent and mining-dependent counties (Cook and Mizer, 1994).

Model Estimation. Each model is estimated separately for metropolitan and nonmetropolitan markets. There are reasons to expect violations of OLS assumptions in these data sets, especially with respect to multicollinearity and heteroskedasticity. Correlation coefficients are quite high between several pairs of variables. Of particular concern in the shortrun data are the correlations between NIB and IDEPS (0.82 in nonmetropolitan markets and 0.94 in metropolitan markets), NXB and XDEPS (0.90 and 0.93), and DNOVO and DMA (0.65 and 0.70). Of concern in the longrun data are correlations between NXB and XTB, and NIB and LPOP, and, in the nonmetropolitan subsamples, NIB and HHI, and HHI and LPOP. We test for multicollinearity using the condition index. Standardizing the data to mean zero and unit variance brings all condition indices below 10, indicating no major problem with statistical dependencies.[6] F tests (not reported here) also indicate little impact of collinearity on the statistical significance of coefficients testing our hypotheses.

In addition, J&S find heteroskedasticity related to the size of economies and use weighted least squares to correct it. Weighting by size of the local economy places greater emphasis on larger economies. Good econometric reasons may exist for doing so. For example, J&S give the following three reasons: (1) Measurement errors may be relatively larger for small economies, (2) measurement problems related to interstate commerce are likely to be relatively larger for smaller States, and (3) small economies are more likely to be dominated by specific industries and suffer from industry-specific shocks that would make their growth rates more variable. We, too, found that using weighted least squares substantially improved the fit of our models.

Given the level of disaggregation of our data, we are also concerned about outliers and influential observations. We tested for influential observations using Cook's D statistic (Cook, 1977). We also removed a small number of outlier observations whose regression errors were more than 50 percent greater in absolute value than the next greatest absolute error.

The longrun model 4 spans 1973-96 and is fitted as two consecutive non-overlapping periods (1973-84 and 1984-96).[7] The use of a single growth rate mea-

[6]Belsley, Kuh, and Welsch (1980) suggest the following relationship between the condition index and multicollinearity: A condition index around 10 indicates that weak dependencies may be starting to affect the regression estimates. A condition index of 30 to 100 indicates moderate to strong collinearity. A condition index larger than 100 indicates that estimates may have a fair amount of numerical error. In this case, the statistical standard error is almost always much greater than the numerical error.

[7]The time periods are not overlapping in that the endpoint of the first 1984 is the starting point of the second. That is, the data from the 1984 calendar year is not included in both periods.

sured over a period of 12 or 13 years in each regression parallels that of Levine (1998) and others, and provides the advantages of smoothing out high-frequency intertemporal noise and mitigating the impact of outlier years in growth rates. While the endpoints of the first sample period are constrained by available data, several factors suggest that the empirical linkages may be different in these two periods. The structure of U.S. banking remained fairly stable during the first half with more than 14,000 banks nationwide from 1970 through 1986, followed by an almost linear decline to fewer than 10,000 banks by the end of 1996. Most of the decline was the result of mergers and acquisitions, though a precipitous rise in the number of bank failures (peaking in the years 1985-92) also contributed to the trend in the mid-1980s. A major wave of banking deregulation began in 1980 with the Depository Institutions Deregulation and Monetary Control Act, many provisions of which (such as the removal of ceilings on deposit interest rates) were phased in over a subsequent multi-year period. Other Federal laws that further deregulated various aspects of banking were passed during the 1980's. At the same time, many States relaxed their restrictions on bank branching, opening the door toward consolidation across local banking markets and permitting aggressive competition from more distant banks.

Sample Statistics and Correlations. We separate our sample into metropolitan and nonmetropolitan markets. Univariate statistics and pairwise correlations reveal several distinguishing characteristics of these markets. During the period 1981-96, annual growth in real per capita personal income was about 0.15 percent faster in nonmetropolitan markets (1.58 percent per year) than metropolitan areas (1.43 percent), on average. Longrun average growth in real per capita personal income was markedly faster in both metropolitan and nonmetropolitan markets from 1984-96 than it had been from 1973-84. In the earlier period, nonmetropolitan markets grew at barely 0.25 percent per year, while metropolitan markets grew about 1 percent per year. In the later period, average longrun growth increased to a bit over 1 percent per year in nonmetropolitan markets and to 1.4 percent per year in metropolitan markets. Note that longrun and shortrun average growth are not directly comparable as the former is a geometric mean of growth calculated over an extended time horizon, while the latter is an arithmetic mean of 1-year growth rates. About 25 percent of nonmetropolitan markets are defined by USDA as farm dependent and another 6 percent are defined as mining dependent.

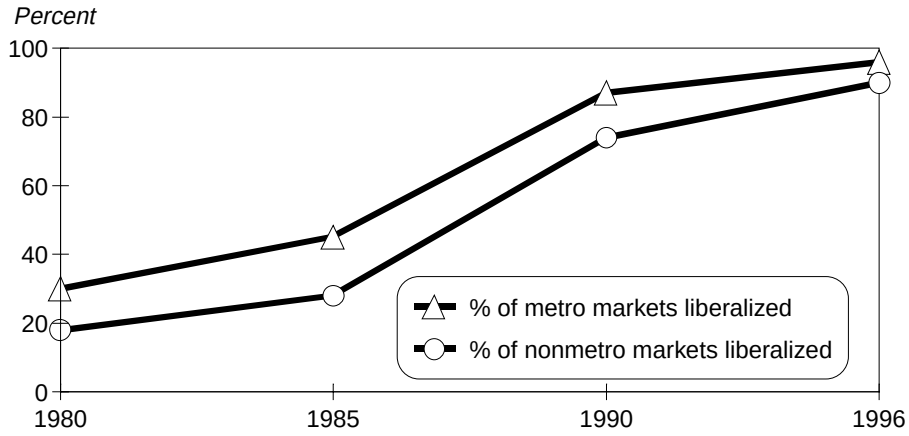
Compared with metropolitan markets, nonmetropolitan markets average far fewer bank offices (8 versus 152), higher market concentration (HHI of 0.4190 versus 0.1779), and far lower levels of total deposits ($159 million versus $6 billion). Standard deviations and coefficients of variation (ratios of the standard deviation to the mean) on these variables indicate that nonmetropolitan markets are more alike in both absolute and relative terms than are metropolitan markets, the latter being skewed by such megalopolises as New York, Los Angeles, and Chicago.

Nonmetropolitan markets have experienced geographic liberalization at a slower pace, and entry by nonlocal firms has been less likely after liberalization. Figure 1 graphs the rates of liberalization and entry into metropolitan and nonmetropolitan markets. The relatively slow rate of entry into nonmetropolitan markets has previously been documented by Amel and Liang (1992 and 1997) and is consistent with Calomiris's (1993) work on the political economy of geographic restrictions in banking. Despite these observations, control of local banking markets by out-of-market banks is surprisingly similar in nonmetropolitan and metropolitan markets: out-of-market banks controlled 27 percent of nonmetropolitan bank offices (versus 29 percent of metropolitan) and 26 percent of nonmetropolitan bank deposits (versus 28 percent of metropolitan).

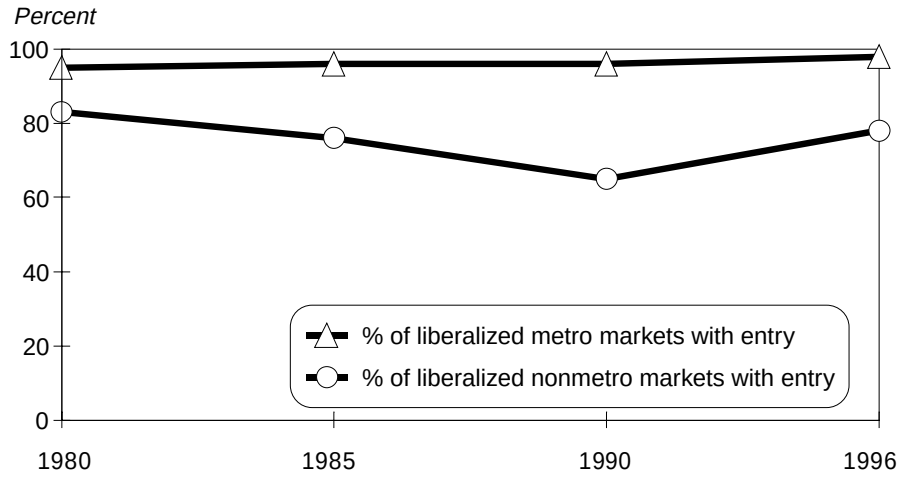
Striking differences between rural and urban pairwise correlations appeared in one or two instances. The correlation between the numbers of in-market and out-of-market owned bank offices is 0.01 in nonmetropolitan areas but 0.48 in metropolitan markets. That is, in-market and out-of-market office numbers often exhibit similar structures in metropolitan markets but not in nonmetropolitan markets. A corresponding contrast arises in in-market vs. out-of-market controlled deposits. Tables 2 and 3 present univariate statistics for our shortrun and longrun datasets, respectively.

Figure 1

A. Metropolitan banking markets liberalized earlier than nonmetropolitan banking markets, . . .



B. And nonlocal entry occurred sooner after liberalization in metropolitan banking markets, . . .



C. Leading to relatively fewer nonmetropolitan banking markets with nonlocally owned bank offices

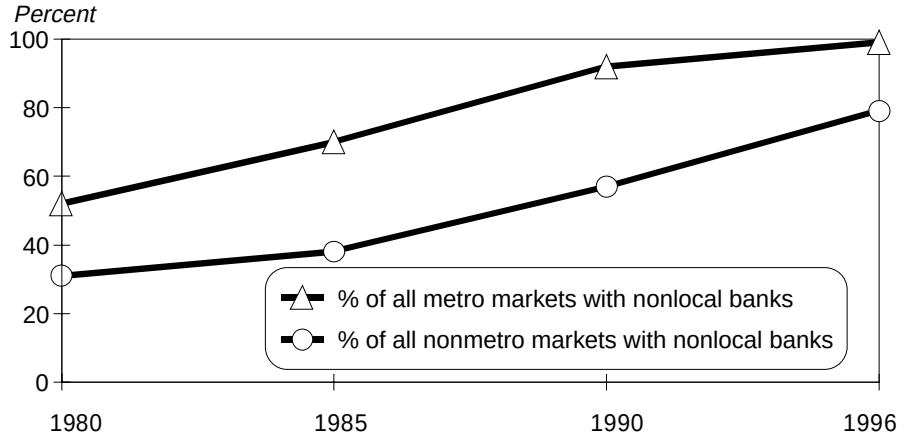


Table 2—Metro and nonmetro sample statistics for shortrun model variables, 1981-96

	Metro (4,272 observations)				Nonmetro (36,128 observations)			
Variable	Mean	Std Dev	Min.	Max.	Mean	Std Dev	Min.	Max.
Yt/Yt-1	1.0143	0.024	0.866	1.163	1.0158	0.074	0.453	4.097
NIB	118.02	281.899	0	3532	5.52	5.048	0	55
NXB	34.30	75.040	0	1113	2.36	4.175	0	49
IDEPS (in millions)	4,046	14,081	0	225,109	94	98	0	3,974
XDEPS (in millions)	781	2452	0	45,721	34	68	0	806
DMA	0.688	0.463	0	1	0.583	0.493	0	1
DNOVO	0.520	0.500	0	1	0.369	0.483	0	1
HHI	0.1779	0.0793	0.0265	0.8199	0.4190	0.2378	0.0737	1
Ratio of bank offices owned out-of-market	0.294	0.287	0	1	0.275	0.348	0	1
Ratio of local bank deposits controlled out-of-market	0.284	0.307	0	1	0.258	0.354	0	1

Table 3—Metro and nonmetro sample statistics for longrun model variables

	Nonmetro, 1973-84 (2,265 observations)				Nonmetro, 1984-86 (2,265 observations)			
Variable	Mean	Std Dev	Min.	Max.	Mean	Std Dev	Min.	Max.
GY	0.00248	0.0164	–0.1238	0.085	0.0108	0.0112	–0.0771	0.0563
NIB	4.710	4.178	0	42	5.822	5.1179	0	46
NXB	0.983	2.4917	0	22	1.795	3.884	0	31
XTB	0.167	0.3259	0	1	0.206	0.3365	0	1
DIB	1.853	3.1724	0	40	1.130	1.1289	0	18
DXB	3.369	11.5616	0	230	12.242	20.9597	0	210
DDEP	0.042	0.183	–1	1	0.191	0.2892	–1	1
DPC	2.32	1.0421	0	7.2305	6.450	3.2101	0	30.5946
LEDU	–2.8255	0.4136	–4.5254	–1.0188	–2.3462	0.3538	–3.467	–0.773
LPOP	9.5292	0.9214	5.6699	11.9975	9.6248	0.9424	4.4659	11.9893
LRPCPI	2.2593	0.2701	1.4106	3.3028	2.2862	0.2015	1.2832	3.3722
HHI	0.4727	0.261	0.0799	1	0.4404	0.2407	0.0784	1
FM	0.245	0.4302	0	1	0.245	0.4299	0	1
MI	0.064	0.2448	0	1	0.064	0.2448	0	1
	Metro, 1973-84 (260 observations)				Metro, 1984-96 (264 observations)			
Variable	Mean	Std Dev	Min.	Max.	Mean	Std Dev	Min.	Max.
GY	0.00982	0.00657	–0.00798	0.034	0.0141	0.00589	–0.00946	0.0282
NIB	54.404	73.244	0	526	97.693	181.898	0	1365
NXB	8.173	19.416	0	139	20.655	38.638	0	261
XTB	0.151	0.274	0	1	0.222	0.289	0	1
DIB	3.429	9.546	0	100	4.218	8.704	0	69.667
DXB	30.754	99.440	0	820	60.345	142.852	0	1190
DDEP	0.0723	0.1568	–0.1396	0.7123	0.2179	0.245	–0.296	0.872
DPC	2.365	0.6608	0.8858	4.5108	5.6113	2.162	1.790	23.736
LEDU	–2.2715	0.3263	–2.9786	–1.177	–1.8785	0.2988	–2.5582	–0.953
LPOP	12.3689	0.9331	10.5125	14.9283	12.5807	1.0172	11.0938	15.9106
LRPCPI	2.3563	0.1484	1.7523	2.7274	2.4663	0.1547	1.8062	3.0278
HHI	0.2203	0.0935	0.0456	0.5646	0.1957	0.0789	0.0403	0.4872

Results and Robustness Issues

Results

Shortrun Models. Table 4 presents results for both OLS and WLS regressions for models 1 and 2, the latter weighted by total personal income in the local market, a proxy for the size of the local economy. For all four regressions, the impact of deregulation is statistically significant and economically important (H1a). These results are consistent with those of J&S despite differences in the time period covered and in the level of aggregation. The significantly positive coefficients on *DMA* indicate that geographic deregulation has benefited the nonmetropolitan markets. However, the nonmetropolitan impact of deregulation is only one-half (OLS) to two-thirds (WLS) the magnitude of the metropolitan impact. For all four regressions, the addition of *HHI* has negligible effect on the coefficient of *DMA* (H2a). The coefficient of *HHI* is significantly negative (H2b), indicating that more concentrated banking markets are associated with slower growth in real per capita personal income on average. This result is consistent with previous research on bank market performance and concentration described above.

For comparison, J&S estimated model 1 with 1,015 State-level observations from 1972-92. Their estimates of *DMA* were 0.0094 (OLS) and 0.0119 (WLS), both statistically significant at the 1-percent level. Thus, our results are quantitatively and qualitatively similar to earlier findings, but indicate a proportionally greater impact on metropolitan than on nonmetropolitan areas. This conclusion holds both in absolute and relative terms. Over the period covered by our data, 1981-96, real per capita personal income grew at an average annual rate of 1.43 percent in metropolitan markets and 1.58 percent in nonmetropolitan markets. Our results suggest that geographic liberalization was associated with an average increase in expected growth of 59 to 87 percent in metropolitan markets and of 28 to 53 percent in nonmetropolitan markets.

Table 4—Estimates from shortrun models 1 and 2[1]

Real per capita income growth, 1980-96

	Weighted by total personal income				Unweighted			
	Metro		Nonmetro		Metro		Nonmetro	
Obs.	4,539		38,046		4,539		38,046	
Adj. R^2	.5859	.5866	.1876	.1877	.4330	.4336	.1333	.1334
DMA	0.0124 (15.26)*	0.0125 (15.31)*	0.0084 (11.09)*	0.0084 (11.11)*	0.0085 (8.42)*	0.0086 (8.48)*	0.0044 (3.48)*	0.0045 (3.49)*
HHI		–0.0138 (–2.78)*		–0.0031 (–2.11)**		–0.0112 (–2.43)**		–0.0035 (–2.02)**

Real per capita income growth, 1980-96

	Weighted by total personal income		Unweighted	
	Farm-dependent		Farm-dependent	
Obs.	8,848		8,848	
Adj. R^2	.1154	.1157	.1129	.1133
DMA	–0.0081 (–2.38)**	–0.0081 (–2.38)**	–0.0107 (–2.47)**	–0.0107 (–2.47)**
HHI		–0.0098 (–2.02)**		–0.0105 (–2.15)**

T-statistics appear in parentheses.
Two-tailed significance levels:
* significant at 1 percent (t > 2.550)
** significant at 5 percent (2.550 > t > 1.960)

[1] For comparison, Jayaratne and Strahan estimated model 1 with 1,015 State-level observations from 1972-92 using both ordinary least squares and weighted least squares. Their OLS estimate of DMA was 0.0094 (3.62*) with an adjusted R^2 of 0.49. Their WLS estimate of DMA was 0.0119 (4.96*) with an adjusted R^2 of 0.70.

The estimates from model 3 are presented in table 5 and results of hypotheses tests are presented in table 6. For brevity, we report only weighted results (unweighted results are available from the authors). Consistent with results from models 1 and 2, the coefficients related to geographic liberalization remain positive, statistically significant and economically important. Coincidentally, the coefficients on DNOVO and DMA in model 3 roughly sum to the coefficients on DMA from models 1 and 2, suggesting that the effect of liberalization can be decomposed into effects from consolidations through holding company acquisitions and mergers and from *de novo* branching. The ratio of the impact of each stage of liberalization is similar in nonmetro areas versus metro areas, with nonmetro areas experiencing about two-thirds the increase in growth experienced in metro areas.

The fact that these coefficients remain significant and of comparable magnitudes across models 1, 2, and 3 indicates that changes in market structure and local bank ownership or local deposit control are not the important avenues through which geographic liberalization affects local growth. At a minimum, these findings may mitigate concerns that shifts toward nonlocal ownership of local bank offices or nonlocal control of local deposits might adversely affect local economic performance. Statistical hypothesis tests indicate that bank office numbers, bank deposits, and deposit market concentration jointly have a statistically significant association (at the 1-percent confidence level) with local economic growth (H3a) in both metro and nonmetro markets. Individually, deposit market concentration maintains its statistically significant negative association (at the 5-percent confidence level) with local economic growth (H3b) in metro but not in nonmetro markets. F tests indicate that the number of bank offices (H3c) and the amount of bank deposits (H3d) are significantly related to economic growth in nonmetro areas only, but there is no evidence that differences in the locus of ownership of bank offices (H3e) or control of bank deposits (H3f) affect these associations. There is, however, weak evidence (statistically significant at the 10-percent confidence level) that local growth in metropolitan markets is more negatively associated with out-of-market bank office ownership than in-market ownership (H3e). Despite the statistical significance of coefficients (especially in nonmetro markets) related to the number of bank offices (NIB and NXB) or amount of local deposits (IDEPS and XDEPS), the economic significance of these associations is small and offsetting.

Longrun Model. The estimates from models 4 are shown in table 7 and results of hypothesis tests are presented in table 8. In each case, the hypothesis that longrun average per capita income growth is independent of initial bank market structure is rejected (H4a), with greater statistical significance for both markets in the later period.

The initial number of bank offices owned in-market (NIB) is positively and significantly associated with subsequent growth rates in real per capita income for the period 1984-96 in both rural and urban markets. In the earlier period, these associations are negative but not significantly so. The initial number of bank offices owned out-of-market (NXB) is positively and significantly associated with subsequent growth in rural markets for 1984-96, but is otherwise not statistically significant. This shift is consistent with the overbanking hypothesis in the 1970's and early 1980's, but is consistent in rural markets for the later period with other empirical findings that more banks are associated with faster economic growth rates (see

Table 5—Estimates from shortrun model 3

	Real per capita income growth (weighted by total personal income)		
	Metro	Nonmetro	Farm-dependent counties
Obs.	4,272	36,128	8,847
Adj. R2	.5705	.1405	.1160
NIB	2.5E-7	1.8E-4	4.0E-4
	(0.14)	(3.12)*	(0.68)
NXB	–9.0E-6	2.1E-4	3.4E-4
	(–1.84)***	(2.24)**	(0.44)
IDEPS	6.6E-8	–7.5E-6	–6.7E-5
	(1.89)***	(–2.94)*	(–1.79)***
XDEPS	–1.3E-7	–1.5E-5	–2.2E-6
	(–1.06)	(–2.95)*	(–0.08)
DNOVO	0.0020	0.0014	0.0068
	(2.06)**	(1.70)***	(1.50)
DMA	0.0102	0.0074	–0.0120
	(9.78)*	(8.92)*	(–2.91)*
HHI	–0.0120	–0.0024	–0.0129
	(–2.34)**	(–1.37)	(–2.12)**

T-statistic in parentheses.
Two-tailed significance levels:
* significant at 1 percent (t > 2.550)
** significant at 5 percent (2.550 > t > 1.960)
***significant at 10 percent (1.960 > t > 1.645)

Table 6—Hypothesis tests from weighted regressions for shortrun models

(1) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma DMA_{t,i} + e_{t,i}$,

(2) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \delta HHI_{t,i} + e_{t,i}$, and

(3) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \gamma_2 DNOVO_{t,i} + \delta_1 HHI_{t,i} + \delta_2 NIB_{t,i} + \delta_3 NXB_{t,i} + \delta_4 IDEPS_{t,i} + \delta_5 XDEPS_{t,i} + e_{t,i}$

Hypothesis: *Local growth is independent of--*		Metro	Nonmetro	Farm-dependent
H1a: *Deregulation*	$\gamma = 0$	t=15.26*	t=11.09*	t=–2.38**
H2a: *Deregulation*	$\gamma = 0$	t=15.31*	t=11.11*	t=–2.38**
H2b: *Market concentration*	$\delta = 0$	t=–2.78*	t=–2.11**	t=–2.02**
H3a: *Bank ownership and market structure*	$\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$	F=23.23*	F=5.05*	F=1.26
H3b: *Concentration*	$\delta_{1,j} = 0$	t=–2.34**	t=–1.37	t=–2.12**
H3c: *Office ownership*	$\delta_{2,j} = \delta_{3,j} = 0$	F=1.71	F=6.98*	F=0.34
H3d: *Deposit control*	$\delta_{4,j} = \delta_{5,j} = 0$	F=2.11	F=9.01*	F=1.65
H3e: *Office ownership differences*	$\delta_{1,j} = \delta_{2,j}$	F=2.87***	F=0.06	F=0.00
H3f: *Deposit control differences*	$\delta_{4,j} = \delta_{5,j}$	F=2.22	F=1.78	F=1.59

Two-tailed significance levels:
* statistically significant at 1 percent
** statistically significant at 5 percent
***statistically significant at 10 percent

King and Levine, 1993a and 1993b; Jayaratne and Strahan, 1996; Krol and Svorny, 1996; Levine, 1998; Rajan and Zingales, 1998; Shaffer, 1998).

The coefficients on NIB and NXB together indicate that intramarket banking consolidation may be harmful to the economic growth of local markets in today's environment. However, the coefficients on the initial measure of bank deposit market concentration (HHI) do not consistently support this conclusion (H4b). For rural banking markets, the coefficient on HHI is insignificant in both periods. For urban markets, the coefficient on HHI is significantly negative in the earlier period and significantly positive in the later period. The lack of significance in rural markets may relate to the fact that bank deposit market concentration for over 90 percent of rural banking markets exceeds the Justice Department's guidelines of 0.1800 throughout the period.

The association between longrun average growth and the initial number of bank offices strengthens over time (H4c) for both metropolitan and nonmetropolitan markets. In the earlier period, the null hypothesis of no association is rejected for neither case, but a strong association exists in the later period, especially for nonmetropolitan markets. A change over time also occurs with respect to in-market and out-of-market ownership of bank offices (H4e). The hypothesis that the association between longrun average growth and bank offices does not differ by locus of ownership (in-market or out-of-market) is weakly rejected for nonmetropolitan markets in the earlier period and for metropolitan markets in the later period. Interestingly, this test becomes insignificant for nonmetropolitan markets in the later period. These results indicate greater cause for concern about bank ownership patterns in metropolitan areas than in nonmetropolitan areas, although the magnitudes of the coefficients indicate very small potential impact on metropolitan growth.

The coefficients on NIB and NXB must be interpreted jointly with the initial mix of local versus nonlocal bank offices (XTB) in this model, since XTB represents a nonlinear interaction between NIB and NXB. The coefficient on XTB (H4d) is negative in all but one case, and statistically significant for rural markets in the earlier period (at the 1-percent confidence level) and for urban markets in the later period (at the 5-percent confidence level). The coefficients on XTB should be interpreted as the association between per capita income growth and the share of out-of-market bank offices, holding the total number of banks constant. A joint calculation involving the estimated coefficients on NIB, NXB, and XTB indicates that, at the sample mean values of these variables, the point estimate of the subsequent average decrease in real per capita income growth associated with bank

offices owned out-of-market in metropolitan markets in 1984 is 0.09 percentage points per year, or 6 percent of the expected average annual growth over the subsequent 12 years.

To this point, we have examined results relating initial conditions to subsequent longrun average growth. Now, we turn to contemporaneous associations between bank ownership structure and deposit control and growth. The model contains two types of contemporaneous measures. The first is the growth rate in the ratio of bank offices owned in-market (DIB) or out-of-market (DXB). The second is the change in the local deposit market share controlled by banks owned out-of-market (DDEP). Both DIB and DXB are positively and significantly associated with income growth in the rural regressions for both periods. In urban markets, DIB is significant and negative in the earlier period and insignificant in the later period, while DXB is significant and negative in the

Table 7—Estimates from longrun model 4

	Real per capita personal income growth (weighted by total personal income)					
Sample	Metro		Nonmetro		Farm-dependent	
Time period	1973-84	1984-96	1973-84	1984-96	1973-84	1984-96
Obs.	260	264	2,265	2,265	555	554
Adj. R^2	.3107	.3058	.5223	.2434	.5748	.3842
INTERCEPT	.0514 (4.58*)	.0442 (4.36*)	0.0721 (11.51*)	0.0829 (13.95*)	0.1690 (9.71*)	0.0893 (6.00*)
NIB	–1.54E-6 (–0.30)	4.21E-6 (3.09*)	–4.28E-5 (–0.86)	2.33E-4 (5.85*)	0.0010 (4.02*)	1.70E-4 (0.80)
NXB	8.36E-6 (0.48)	–9.58E-6 (–1.53)	1.26E-4 (1.46)	2.09E-4 (4.36*)	9.32E-4 (2.64*)	–0.0012 (–4.45*)
XTB	–.0037 (–1.56)	–.0044 (–2.29**)	–0.0035 (–3.21*)	0.0011 (1.18)	–0.0028 (–1.09)	0.0011 (0.46)
DDEP	.0056 (2.43**)	–.0028 (–1.85***)	–7.34E-4 (–0.59)	2.20E-4 (0.28)	–0.0056 (–1.22)	–0.0013 (–0.58)
DIB	–6.1E-5 (–2.63*)	1.11E-5 (0.56)	8.64E-5 (1.76***)	5.74E-4 (4.54*)	7.02E-4 (3.53*)	2.95E-4 (0.64)
DXB	4.53E-7 (0.18)	–4.27E-6 (–3.08*)	2.65E-5 (2.19**)	2.06E-5 (2.52**)	–1.78E-5 (–0.11)	7.60E-7 (0.02)
LPOP	.0017 (2.78*)	0.0011 (2.35**)	0.0025 (5.43*)	–9.91E-4 (–2.23**)	–0.0039 (–2.87*)	0.0012 (1.04)
LEDU	.0088 (6.62*)	0.0032 (2.15**)	0.0041 (8.01*)	0.0039 (7.65*)	0.0061 (3.60*)	4.60E-4 (0.26)
LRPCI	–.0187 (–5.70*)	–0.0150 (–4.46*)	–0.036719 (–31.44*)	–0.0234 (–19.69*)	–0.0573 (–24.80*)	–0.0388 (–14.05*)
DPC	.0014 (2.36**)	–0.0004 (–2.29**)	0.001254 (4.14*)	–9.77E-5 (–1.06)	0.0030 (4.46*)	5.81E-4 (3.31*)
HHI	–.0112 (–2.81*)	0.0133 (3.09*)	–0.000851 (–0.64)	–0.0011 (–0.79)	–1.22E-4 (–0.03)	–0.0087 (–3.00*)
FM			–0.006594 (–10.05*)	–0.0022 (–3.63*)		
MI			0.002956 (3.64*)	–0.0066 (–9.65*)		

T-statistic in parentheses.
Two-tailed significance levels:
* significant at 1 percent
** significant at 5 percent
***significant at 10 percent

later period but insignificant in the earlier period. For rural markets, the hypothesis that these two variables have equal coefficients (H4f) is rejected in the later period but not in the earlier period. For urban markets, the reverse holds—the hypothesis is rejected for the earlier but not the later period.

Since both DIB and DXB measure contemporaneous changes in the presence of bank offices owned in-market and out-of-market, they cannot reveal information about causal links between the structure of financial intermediation and local economic growth. Banks may expand or contract their local office numbers in response to a number of factors including past local growth, anticipated local growth, changes in the local competitive environment, and changes in banking regulations. During the period of interest rate ceilings on bank deposits that ended in the early 1980's, banks were forced to compete through non-price mechanisms, including convenient office locations. With this in mind, the significantly negative coefficients for the urban regressions are striking, and may be consistent with the overbanking hypothesis: the numbers of banks either declined in the fastest-growing cities (suggesting initial overbanking in those communities) or grew in economically declining cities (suggesting a trend toward overbanking in those MSA's), or both. As banks with large branching networks began consolidating in the 1980's—a process that increased the number of banks owned out-of-market—they also began rationalizing their branching networks by closing redundant branches (Frydl, 1993; Edwards, 1996).

Similarly, the contemporaneous change in the share of deposits controlled by banks owned out-of-market

Table 8—Hypothesis tests from weighted regressions for longrun model

$$(4)\quad \overline{GY}_{t_T,t_0} = \alpha + \beta_1 NIB_{t_0} + \beta_2 NXB_{t_0} + \beta_3 XTB_{t_T,t_0} + \beta_4 DIB_{t_T,t_0} + \beta_5 DB_{t_T,t_0} + \beta_6 DDEP_{t_T,t_0} + \gamma_1 DPC_{t_0} + \gamma_2 LEDU_{t_0} + \gamma_3 LPOP_{t_0} + \gamma_4 LRPCPI_{t_0} + \gamma_5 HHI_{t_0} + e$$

Hypothesis:	1973-84			1984-96		
Local growth is independent of--	Metro	Nonmetro	Farm dependent	Metro	Nonmetro	Farm dependent
H4a: *Initial local bank market structure* $\beta_{1,j} = \beta_{2,j} = \beta_{3,j} = \gamma_{5,j} = 0$	F=3.77*	F=3.24**	F=5.58*	F=8.96*	F=13.56*	F=16.72*
H4b: *Initial deposit market concentration* $\gamma_{5,j} = 0$	t= –2.81*	t= –0.64	t= –0.03	t=3.09*	t=–0.79	t= –3.00*
H4c: *Initial number of local bank offices* $\beta_{1,j} = \beta_{2,j} = 0$	F=0.17	F=1.58	F=9.39*	F=4.95*	F=24.68*	F=12.23*
H4d: *Initial percent of out-of-market ownership* $\beta_{3,j} = 0$	t=–1.56	t=–3.21*	t=–1.09	t=–2.29**	t=1.18	t=0.46
H4e: *Initial locus of ownership of bank offices* $\beta_{1,j} = \beta_{2,j}$	F=0.30	F=3.14***	F=0.06	F=4.09**	F=0.16	F=22.22*
H4f: *Contemporaneous shift in locus of ownership of bank offices* $\beta_{4,j} = \beta_{5,j}$	F=6.95*	F=1.46	F=7.67*	F=0.61	F=20.48*	F=0.45
H4g: *Contemporaneous shift in locus of control of local bank deposits* $\beta_{6,j} = 0$	t=2.43**	t=–0.59	t=–1.22	t=–1.85***	t=0.28	t=–0.59

Two-tailed significance levels:
* statistically significant at 1 percent
** statistically significant at 5 percent
***statistically significant at 10 percent

(DDEP) cannot be interpreted as providing information on the direction of causality. DDEP is not significantly related to longrun average growth (H4g) in rural markets in either period, but has a significantly positive coefficient for urban markets in the earlier period and a significantly negative coefficient in the later period. These results are consistent with results from the shortrun model 3, indicating no significant difference in the association between growth and control of deposits (H3f) in rural markets.[8] The lack of significance of either hypothesis related to control of local deposits indicates that nonlocal banks do not retard growth in rural areas (such as by exporting deposits to other localities) any more than local banks do.

Changes in the coefficients on NIB, NXB, XTB, and DDEP over time are consistent with an increasingly negative relationship between longrun growth and nonlocal ownership in metropolitan markets and an increasingly positive relationship between longrun growth and nonlocal ownership in nonmetropolitan markets. While the negative, statistically significant coefficient on XTB is consistent with a negative relationship between nonlocal control in rural areas and longrun average growth rates in local real per capita income in the earlier period, the more recent evidence is consistent with evidence from shortrun models that, on average, no harm and some benefits may accrue from geographic liberalization and entry by out-of-market owned firms.

Farm-Dependent Counties. Much of the concern about nonlocal bank ownership has agrarian roots and much of the research on the impact of bank consolidation has focused on agricultural lending. To shed further light on whether farm areas are affected differently by geographic liberalization and nonlocal bank ownership or deposit control, we reestimate models 1 through 4 for farm-dependent rural counties. USDA defines counties as farm-dependent if farm income averages more than 20 percent of total income from 1987 to 1989. Results from this estimation are presented alongside other results in tables 4 through 8.

Over the 1981-96 period, real per capita personal income grew in farm-dependent markets by 2.16 percent on average each year. Results from models 1 and 2 suggest that on average geographic liberalization was associated with a decrease in expected growth of 37 to 50 percent in these markets.

The results differ in striking ways from those for other rural or urban banking markets, lend support to Calomiris's wealth insurance hypothesis, and suggest that an empirical basis may exist for agrarian misgivings about liberalization. In contrast to other rural markets, results from the shortrun models indicate that reduced growth is associated with geographic liberalization in farm-dependent markets (H1a and H1b). In addition, the negative association between deposit market concentration and growth is stronger in farm-dependent markets than in other rural markets (H2b and H3b). Each of these results is statistically significant at the 5-percent confidence level. As in other rural markets, there is no evidence that the locus of ownership of local bank offices or the locus of deposit control affects shortrun growth rates.

The longrun model enriches these results, indicating a relatively large, negative, and statistically significant association between the initial number of bank offices owned out-of-market and subsequent longrun average income growth from 1984-96. In this period, the hypothesis that the association between local growth and bank office numbers is invariant to the locus of ownership of bank offices (H4e) is soundly rejected. Initial deposit market concentration also has a relatively large, negative, and statistically significant association with longrun average income growth in this period. Interestingly, initial market concentration was not significantly related to longrun average growth in the 1973-84 period. Given that the earlier period generally coincides with a time of prosperity in U.S. agriculture and that the latter period starts near the trough of the agricultural recession of the 1980's, these results may indicate substantial differences in the commitment of nonlocal banks to local areas consistent with Calomiris (1993).

Robustness Issues

The empirical models in this paper are susceptible to several criticisms related to spurious causality or omitted variables. These issues can be addressed by controlling for other plausible contemporaneous changes or business cycle effects. The possibility of reverse causality is usually addressed by considering

[8] Given the difference in time periods, the weak significance in the later period and the change in sign between the two periods, the results of the longrun model for metropolitan markets is also consistent with those from the shortrun model.

lagged independent variables in the shortrun context, or initial as opposed to contemporaneous independent variables in the longrun context. For example, J&S present evidence that geographic deregulation did not coincide with growth-enhancing policy changes at the State level and that States tended to liberalize at the trough of a recession. These results are applicable to the research here as well since decisions to deregulate as well as many important macro policies are determined at the State level. Unfortunately, uniform information on plausible local growth policies is not readily available, so we are unable to conduct similar tests at the local level. J&S also estimate their model with three lags of the dependent variable to control for the State-level business cycle, finding coefficients on DMA that were smaller in magnitude but still economically and statistically significant.

We address the possibility of reverse causality (that is, that bank market structure and ownership reflect banks' anticipation of local growth) by reestimating shortrun model 3 with lags of the independent variables related to bank ownership and market structure. Results in tables 9 and 10 indicate greater levels of statistical significance for lagged variables and associated hypotheses than for their contemporaneous counterparts in tables 5 and 6. It is unlikely that the linkage between income growth and these lagged variables represents reverse causality, although the possibility of joint causality or omitted variables cannot be entirely dismissed.

It is even less likely that the variables representing initial conditions in the longrun model 4 reflect reverse causality (i.e., that subsequent income growth rates influence the *ex ante* banking structure). Although banks, like other businesses, have a financial incentive to try to predict and adapt to future market conditions, accurate forecasts are very difficult and rarely attained, particularly over horizons in excess of 10 years as measured by our growth vari-

Table 9—Estimates of shortrun model 3 with lagged independent variables

	Real per capita income growth (weighted by total personal income)		
Sample	Metro	Nonmetro	Farm-dependent
Obs.	4272	36128	8848
Adj. R2	.5681	.1419	.1160
NIBt-1	5.5E-6 (3.12)*	4.4E-4 (6.45)*	5.1E-4 (0.87)
NXBt-1	–1.3E-5 (–2.68)*	3.6E-4 (3.75)*	–6.3E-5 (–0.08)
IDEPSt-1	–8.0E-8 (–2.34)**	–2.2E-5 (–6.50)*	–7.6E-5 (–2.03)**
XDEPSt-1	–5.0E-8 (–0.40)	–2.7E-5 (–5.08)*	6.1E-6 (0.21)
DNOVO	0.0027 (2.75)*	0.0014 (1.76)***	0.0069 (1.53)
DMA	0.0100 (9.50)*	0.0071 (8.51)*	–0.0120 (–2.92)*
HHI	–0.0135 (–2.63)*	–0.0024 (–1.38)	–0.0137 (–2.27)**

T-statistics in parentheses.
Two-tailed significance levels:
* significant at 1 percent (t > 2.550)
** significant at 5 percent (t > 1.960)
*** significant at 10 percent (t > 1.645)

Table 10—Hypothesis tests from weighted regressions for shortrun model 3 with lagged independent variables

(3) $Y_{t,i} / Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 DMA_{t,i} + \gamma_2 DNOVO_{t,i} + \delta_1 HHI_{t-1,i} + \delta_2 NIB_{t-1,i} + \delta_3 NXB_{t-1,i} + \delta_4 IDEPS_{t-1,i} + \delta_5 XDEPS_{t-1,i} + e_{t,i}$

Hypothesis: *Local growth is independent of--*		Metro	Nonmetro	Farm-dependent
H3a: *Bank ownership and market structure*	$\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$	F=22.74*	F=19.30*	F=1.27
H3b: *Concentration*	$\delta_{1,j} = 0$	t=–2.63*	t=–1.38	t=–2.27**
H3c: *Office ownership*	$\delta_{2,j} = \delta_{3,j} = 0$	F=7.01*	F=26.89*	F=0.38
H3d: *Deposit control*	$\delta_{4,j} = \delta_{5,j} = 0$	F=3.04**	F=35.54*	F=2.16
H3e: *Office ownership differences*	$\delta_{2,j} = \delta_{3,j}$	F=11.31*	F=0.52	F=0.33
H3f: *Deposit control differences*	$\delta_{4,j} = \delta_{5,j}$	F=0.05	F=0.74	F=2.60

Two-tailed significance levels:
* statistically significant at 1 percent
** statistically significant at 5 percent

ables. Moreover, the economic growth rates exhibit virtually no persistence from one decade to another for the average market in our sample. The Pearson correlation coefficients between the growth rate of income over 1973-84 and that over 1984-96 are not significantly different from zero and are actually slightly negative: -0.021 and -0.101 for the rural and urban samples, respectively. Thus, simple extrapolation from historical economic growth rates would not have permitted banks to foresee accurately the future growth rates in the average U.S. market. Furthermore, growth in per capita income does not necessarily indicate overall market growth or an attractive market for bank entry; it is quite possible to experience growing per capita income even in a market with declining population. Finally, changes in bank structure over the sample period are controlled for as separate regressors that should capture any response by the banking industry to local market conditions.

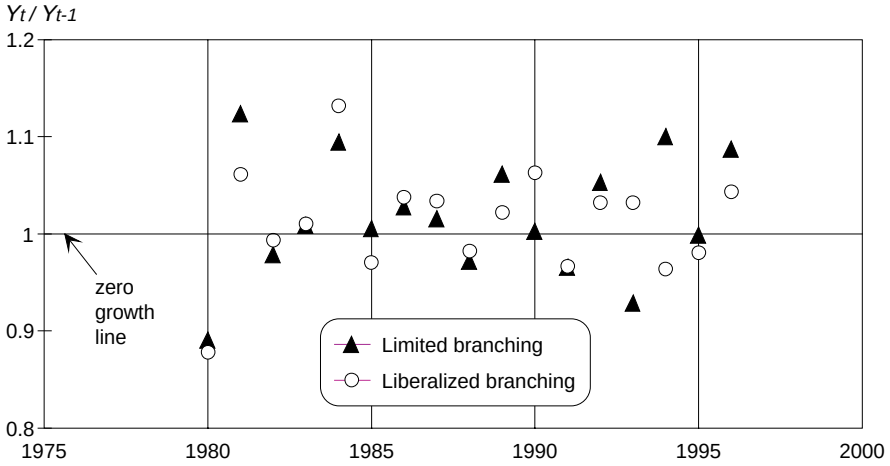
Perhaps the most plausible argument that these results reflect omitted variables or joint causality can be made for shortrun models 1 and 2, especially for farm-dependent counties. After all, many States liberalized geographic restrictions because of the wave of bank failures related to the agricultural recession of the 1980's. These States might have liberalized in a period when their farm economies continued to underperform. Figure 2 presents some informal evidence with respect to this possibility. During the height of the farm recession (roughly 1984-88) farm-dependent counties with liberalized branching rules outperformed those with limited branching in every year except 1985. Ironically, farm-dependent counties with liberalized branching perform less well than those with limited branching in relatively stable or prosperous periods. Another way to control for the effect of local business cycles is to add lagged dependent variables to the model. Table 11 shows that doing so weakens the magnitudes of the coefficients for metro and farm-dependent markets but substantially increases their magnitudes for nonmetro markets. In addition, the negative relationship between liberalization and growth in farm-dependent markets loses its statistical significance, indicating that the farm business cycle may indeed be an important confounding influence in these counties.

Table 11—Estimates of shortrun model 2 with three lags of dependent variable

	Real per capita income growth, 1980-1996 Weighted by total personal income		
	Metro	Nonmetro	Farm-dependent
Obs.	3,738	31,612	7,770
Adj. R2	.5837	.1908	.2523
DMA	0.0103 (10.98)*	0.0131 (16.70)*	–0.0048 (–1.46)
HHI	–0.0039 (–0.76)	–0.0021 (–1.43)	–0.0063 (–1.39)

T-statistics in parentheses.
Two-tailed significance levels:
* significant at 1 percent

Figure 2
Bank branching restrictions and real per capita income growth in farm-dependent rural counties, 1980-96



Vertical axis indicates 1+ real growth in per capita personal income. Therefore, a level of 1 on the vertical axis indicates zero real growth, below 1 indicates a decline, and above 1 indicates an increase over the previous year.

Conclusions and Policy Implications

Local banks may behave differently from nonlocal banks because of superior access to local information, greater commitment to local prosperity, and differences in technology or risk management, both of which tend to be related to bank size. A large body of empirical research exists on the impacts of deregulation, concentration, and out-of-market entry on bank behavior. This research has focused on changes in loan portfolio size, allocation, and quality, as well as in operating efficiency, risk management, loan and deposit pricing, and small bank competitiveness following liberalization or bank consolidations. Research results provide evidence that liberalization often affects bank behavior and that large banks often behave differently from small banks. However, this research does less to address the underlying issue of whether these differences are beneficial or detrimental to local economies.

Another line of research has sought to relate financial market structures to economic growth. Both international and domestic studies have found important positive linkages between financial markets and growth. The research presented here extends this line of inquiry by relating bank market structure and regulatory change to economic growth at the local market level. A central issue is the distribution of previously documented positive relationship between geographic deregulation and State-level growth among metropolitan and nonmetropolitan areas. Other important issues revolve around the impacts of bank market concentration, out-of-market ownership of local bank offices, and out-of-market control of local deposits. To illuminate these issues, we estimated empirical models that relate both shortrun and longrun growth in real per capita personal income to bank market concentration, in-market or out-of-market ownership of local bank offices, and in-market or out-of-market control of local bank deposits. We estimated separate models for metropolitan, nonmetropolitan, and farm-dependent markets. The latter markets are a subset of nonmetropolitan markets and are of interest because of the historical link between these markets and restrictions on bank branching. We estimate longrun models over two time periods. The first—from 1973-84—largely predates liberalization in nonmetropolitan areas, while the second—from 1984-96—coincides with increasing liberalization of geographic banking restrictions.

Our results generally support the importance of the linkage between geographic liberalization and local growth in the short run. Estimates of this impact in metropolitan markets ranged as high as 1.2 percent per year or 87 percent of expected growth rates. Nonmetropolitan markets exhibited a smaller but still important impact of 0.84 percent per year or 53 percent of expected growth rates. These results are qualitatively robust to different specifications, although magnitudes change depending on weighting or on the inclusion of lagged dependent variables. Controlling for market concentration and bank ownership structure did not materially alter these coefficients or their statistical significance, indicating that observed levels of bank market concentration, bank ownership, and deposit control do not capture the impact of liberalization on local shortrun growth. In addition, while F tests indicated that market structure was statistically significant, the location of neither bank office ownership nor deposit control was statistically related to shortrun growth in nonmetropolitan areas. However, in metropolitan areas, out-of-market ownership of bank offices was associated with lower shortrun growth rates, though the magnitude of this effect is economically small.

Results from our longrun model generally support and enrich our shortrun results. Two features are particularly striking. First, no evidence suggested that nonlocal banks are detrimental to local economic growth in rural areas in the more recent period. Second, the impact of nonlocal banks was more positive in rural areas in the later period than in the earlier period, but the reverse was true of metropolitan markets.

Results from farm-dependent markets, however, remind us that these results reflect average and not universal associations. In farm-dependent markets, liberalization was associated with a decrease in shortrun growth and initial levels of out-of-market bank ownership were associated with a fall in longrun growth in the more recent period. However, the shortrun result was not statistically robust to the inclusion of lagged dependent variables to control for local business cycles.

These findings suggest that out-of-market bank mergers or acquisitions need not, *ceteris paribus*, impair local economic growth, and may even have beneficial effects in rural markets. Although the empirical tests

here cannot identify a mechanism by which this effect might operate, they suggest avenues for future research. For example, it is a paradox that liberalization appears to have a more positive association with growth in metropolitan markets than in nonmetropolitan markets, but that out-of-market owned banks, *per se*, appear to be more negatively associated with growth in metropolitan areas.

This research could be extended in a number of directions. For example, future research could explore the association of local growth to the local presence of banks of different asset sizes or of local headquarters of multimarket banks. However, alternative explanations for the apparent connection between geographic liberalization and economic growth beyond measures of bank ownership or observed market structure should also be explored. J&S believe their evidence to be consistent with improved quality of loan portfolios. Other possible explanations may involve improvements in bank operating efficiency and the quality of bank intermediation related to changes in market contestability and the market for control of underperforming banks.

References

Amel, Dean F., no date, "State Laws Affecting the Geographic Expansion of Commercial Banks." Unpublished paper. Board of Governors of the Federal Reserve System. Washington, DC.

Amel, Dean F., and Liang, J. Nellie, 1992, "The relationship between entry into banking markets and changes in legal restriction on entry," *The Antitrust Bulletin* 37, pp. 631-49.

Amel, Dean F., and Liang, J. Nellie, 1997, "Determinants of Entry and Profits in Local Banking Markets," *Review of Industrial Organization*, Vol. 12, No. 1, pp. 59-78.

Avery, Robert B., Raphael W. Bostic, Paul S. Calem, and Glenn B. Canner, 1999, "Consolidation and Bank Branching Patterns," *Journal of Banking and Finance* 23 (2-4), February, 497-532.

Barry and Associates, 1995, *Agency market funds, commercial banks, and rural credit*, Champaign-Urbana, IL.

Belsley, D.A., Kuh, E., and Welsch, R.E., 1980, *Regression Diagnostics*, New York: John Wiley & Sons, Inc.

Berger, Allen N., 1999, "The 'big picture' about relationship-based finance: Discussion comments," in Jackson L. Blanton, Alicia Williams, and Sherrie L.W. Rhine, eds., *Business Access to Capital and Credit: A Federal Reserve System Research Conference*. Federal Reserve Bank of Chicago, pp. 390-400.

Berger, Allen N., Rebecca S. Demsetz, and Philip E. Strahan, 1999, "The consolidation of the financial services industry: Causes, consequences, and implications for the future," *Journal of Banking and Finance* 23, pp. 135-194.

Berger, Allen N., and Timothy H. Hannan, 1989, "The Price-Concentration Relationship in Banking," *Review of Economics and Statistics* 71, pp. 291-299.

Berger, Allen N., and Timothy H. Hannan, 1997, "Using measures of firm efficiency to distinguish among alternative explanations of the structure-performance relationship," *Managerial Finance* 23, pp. 6-31.

Berger, Allen N., Gerald A. Hanweck, and David B. Humphrey, 1987, "Competitive viability in banking: Scale, scope and product mix economies," *Journal of Monetary Economics* 20, pp. 501-520.

Berger, Allen N., and David B. Humphrey, 1991, "The dominance of inefficiencies over scale and product mix economies in banking," *Journal of Monetary Economics* 28, pp. 117-148.

Berger, Allen N., A.K Kashyap, and J.M. Scalise, 1995, *The transformation of the U.S. banking industry: What a long, strange trip it's been*, Brookings Papers on Economic Activity (2:1995), 55-218.

Berger, Allen N., and Loretta J. Mester, 1997, "Inside the black box: What explains differences in the efficiencies of financial institutions?" *Journal of Banking and Finance* 21, pp. 895-947.

Berger, Allen N., Anthony Saunders, J. Scalise, and Gregory F. Udell, 1998, "The Effects of Bank Mergers and Acquisitions on Small Business Lending," *Journal of Financial Economics* 50, 187-229.

Berger, Allen N., and Gregory F. Udell, 1996, "Universal Banking and the Future of Small Business Lending," in *Universal Banking: Financial System Design Reconsidered*, ed. by Anthony Saunders and Ingo Walter (Burr Ridge, Ill.: Irwin Publishing).

Black, Fisher, 1975, "Bank funds management in an efficient market," *Journal of Financial Economics* 2, pp. 323-39.

Broecker, Thorsten, 1990, "Credit-Worthiness Tests and Interbank Competition," *Econometrica* 58 (2), March, 429-452.

Calem, P.S., and Nakamura, L.I., 1995, *Branch Banking and the Geography of Bank Pricing*, Finance and Economics Discussion Paper 95-25. Washington, DC: Board of Governors of the Federal Reserve System.

Calomiris, Charles W., 1993, "Regulation, Industrial Structure, and Instability in U.S. Banking," in *Structural Change in Banking*, M. Klausner and L. White, eds., Business One Irwin, Homewood, IL, pp. 19-116.

Calomiris, Charles W., and Larry Shweikart, 1988, "Was the South backward? North-South differences in antebellum banking," University of Pennsylvania working paper.

Calomiris, Charles W., R. Glenn Hubbard, and James H. Stock, 1986, "The Farm Debt Crisis and Public Policy," *Brookings Papers on Economic Activity* 2, pp. 441-86.

Clark, J., 1996, "Economic cost, scale efficiency and competitive viability in banking," *Journal of Money, Credit, and Banking* 28, pp. 342-64.

Cole, Rebel A., Lawrence G. Goldberg, and Lawrence J. White, 1999, "Cookie-cutter versus character: The micro structure of small business lending by large and small banks," in Jackson L. Blanton, Alicia Williams, and Sherrie L.W. Rhine, eds., *Business Access to Capital and Credit: A Federal Reserve System Research Conference*. Federal Reserve Bank of Chicago, pp. 362-89.

Cook, R.D., 1977, "Detection of Influential Observations in Linear Regression," *Technometrics*, 19, 15 -18.

Cook, Peggy J., and Karen L. Mizer, 1994, *The Revised ERS County Typology*, U.S. Department of Agriculture, Economic Research Service, Rural Development Research Report Number 89.

Cyrnak, Anthony, and Timothy H. Hannan, 1998, "Bank lending to small businesses and the use of CRA loan data to measure market structure," working paper, Federal Reserve Board, Washington, DC.

DeYoung, Robert, 1998, "Comment on Goldberg and White," *Journal of Banking and Finance* 22, pp. 868-72.

DeYoung, Robert, I. Hasan, and B. Kirchhoff, 1997, *Out-of-State Entry and the Cost Efficiency of Local Commercial Banks*, Economics Working Papers 97-7. Washington, DC: Office of the Comptroller of the Currency.

DeYoung, Robert, Lawrence G. Goldberg, and Lawrence J. White, 1999, "Youth, Adolescence and Maturity at Banks: Credit Availability to Small Business in an Era of Banking Consolidation," *Journal of Banking and Finance* 23 (2-4), February, 463-492.

Diamond, Douglas W., 1984, "Financial intermediation and delegated monitoring," *Review of Economic Studies* 51, pp. 393-414.

Edwards, Franklin R., 1996, *The New Finance: Regulation and Financial Stability,* Washington, DC: AEI Press.

Evanoff, Douglas D., 1988, "Branch Banking and Service Accessibility," *Journal of Money, Credit, and Banking* 20 (May), pp. 191-202.

Federal Reserve Bank of Kansas City, 1997, *Financing Rural America*, Kansas City, MO

Ferrier, Gary, Shawna Grosskopf, Kathy Hayes, and S. Yaisawarng, 1993, "Economics of diversification in the banking industry: A frontier approach," *Journal of Monetary Economics* 31, pp. 229-49.

Frydl, Edward J., 1993, "Studies on Excess Capacity in the Financial Sector," Federal Reserve Bank of New York Research Paper 9310-9323, June.

Gilbert, R. Alton, and Michael T. Belongia, 1988, "The Effects of Affiliation with Large Bank Holding Companies on Bank Lending to Agriculture," *American Journal of Agricultural Economics* 70, pp. 69-78.

Goldberg, Lawrence G., and L.J. White, 1998, "De novo banks and lending to small businesses," *Journal of Banking and Finance* 22, pp. 851-867.

Goldberg, Lawrence G., and Gerald A. Hanweck, 1988, "What can we expect from interstate banking?" *Journal of Banking and Finance,* 12, pp. 51-67.

Gunther, Jeffery W., 1997, "Geographic Liberalization and the Accessibility of Banking Services in Rural Areas," Financial Industry Studies Working Paper No. 1-97. Dallas, TX: Federal Reserve Bank of Dallas, February.

Hancock, Diana, and James A. Wilcox, 1998, "The 'credit crunch' and the availability of credit to small business," *Journal of Banking and Finance* 22, pp. 983-1014.

Hannan, Timothy H., 1991, "Bank commercial loan markets and the role of market structure: Evidence from surveys of commercial lending," *Journal of Banking and Finance* 15, 133-49.

Hannan, Timothy H., 1994, "Asymmetric price rigidity and the responsiveness of customers to price changes: The case of deposit interest rates," *Journal of Financial Services Research* 8, pp. 257-67.

Hannan, Timothy H., 1997, "Market share inequality and the number of competitors, and the HHI: An examination of bank pricing," *Review of Industrial Organization* 12, pp. 23-35.

Hannan, Timothy H., 1998, "Bank fees and their variation across bank locations." Working paper, Federal Reserve Board, Washington, DC.

Hannan, Timothy H., and Allen N. Berger, 1991, "The rigidity of prices: Evidence from the banking industry," *American Economic Review* 81, pp. 938-45.

Haynes, George W., Charles Ou and Robert Berney, 1999, "Small business borrowing from large and small banks," in Jackson L. Blanton, Alicia Williams, and Sherrie L.W. Rhine, eds., *Business Access to Capital and Credit: A Federal Reserve System Research Conference*. Federal Reserve Bank of Chicago, pp. 287-327.

Houston, Joel F., and Christopher M. James, 1998, "Do bank internal capital markets promote lending?" *Journal of Banking and Finance* 22, pp. 899-918.

Houston, Joel F., Christopher M. James, and D. Marcus, 1997, "Capital market frictions and the role of internal capital markets in banking," *Journal of Financial Economics* 46, 135-164.

Hughes, Joseph P., William Lang, Loretta J. Mester, and C. G. Moon, 1999, "The dollars and sense of bank consolidation," *Journal of Banking and Finance* 23, pp. 291-324.

Jackson, William E. III, 1992, "Is the Market Well Defined in Bank Merger and Acquisition Analysis?" *The Review of Economics and Statistics* 74, November, 655-661.

Jackson, William E. III, 1997, "Market structure and the speed of price adjustments: Evidence of nonmonotonicity," *Review of Industrial Organization* 12, 37-57.

Jayaratne, Jith, and Philip E. Strahan, 1996, "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation," *Quarterly Journal of Economics* 111 (3), August, 639-670.

Kashyap, Anil, and Jeremy Stein, forthcoming, "What Do A Million Observations on Banks Say About the Transmission of Monetary Policy?" *American Economic Review*.

Keeton, W.R., 1995, "Multi-office bank lending to small businesses: Some new evidence," *Federal Reserve Bank of Kansas City Economic Review* 80 (2), 45-57.

King, Robert, and Ross Levine, 1993a, "Finance and Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics* 108 (3), August, 717-738.

King, Robert, and Ross Levine, 1993b, "Finance, Entrepreneurship, and Growth: Theory and Evidence," *Journal of Monetary Economics* 32, pp. 513-542.

Krol, Robert, and Shirley Svorny, 1996, "The Effect of the Bank Regulatory Environment on State Economic Activity," *Regional Science and Urban Economics* 26 (5), August, 531-541.

Laderman, E.S., R.H. Schmidt, and G.C. Zimmerman, 1991, "Location, Branching, and Bank Portfolio Diversification: The Case of Agricultural Lending," *Federal Reserve Bank of San Francisco Economic Review* (Winter), 24-37.

Leland, Hayne, and David Pyle, 1977, "Informational asymmetries, financial structure and financial intermediation," *Journal of Finance* 32, pp. 371-87.

Levine, Ross, and S. Zervos, 1998, "Stock Markets, Banks, and Economic Growth," *American Economic Review* 88 (June), pp. 537-558.

Levine, Ross, 1998, "The Legal Environment, Banks, and Long-Run Economic Growth," *Journal of Money, Credit, and Banking* 30 (3), August, Part 2, 596-613.

Levonian, Mark, and Soller, J., 1996, "Small Banks, Small Loans, Small Business," *Federal Reserve Bank of San Francisco Weekly Letter*, No. 96-02, Jan. 12, pp. 1-3.

McAllister, P.H., and D.A. McManus, 1993, "Resolving the scale efficiency puzzle in banking," *Journal of Banking and Finance* 17, pp. 389-405.

Morgan, Donald P., 1998, "Bank mergers, efficiency, and diversification," Working paper, Federal Reserve Bank of New York, New York.

Neumark, David, and Stephen A. Sharpe, 1992, "Market structure and the nature of price rigidity: Evidence from the market for consumer deposits," *Quarterly Journal of Economics* 107, pp. 657-680.

Peek, Joe, and Eric S. Rosengren, 1996, "Small Business Credit Availability: How Important is Size of Lender?" in *Universal Banking: Financial System Design Reconsidered*, ed. by Anthony Saunders and Ingo Walter (Burr Ridge, Ill.: Irwin Publishing).

Peek, Joe, and Eric S. Rosengren, 1998, "Bank Consolidation and Small Business Lending: It's Not

Just Bank Size that Matters," *Journal of Banking and Finance* 22 (6-8), August, 799-819.

Petersen, Mitchell A., and Raghuram G. Rajan, 1995, "The effect of credit market competition on lending relationships," *Quarterly Journal of Economics* 110, 407-443.

Prager, Robin A., and Timothy H. Hannan, 1999, "Do substantial horizontal mergers generate significant price effects? Evidence from the banking industry," *Journal of Industrial Economics*

Radecki, L.J., 1998, "The Expanding Geographic Reach of Retail Banking Markets," Federal Reserve Bank of New York, *Economic Policy Review*, June, pp. 15-34.

Rajan, Raghuram G., and Luigi Zingales, 1998, "Financial Dependence and Growth," *American Economic Review* 88 (3), June, 559-586.

Rose, John T., and John D. Wolken, 1990, "Geographic diversification in banking, market share changes, and viability of small independent banks," *Journal of Financial Services Research* 4, pp. 5-20.

Savage, Donald T., 1993, "Interstate banking: A status report," Board of Governors, *Federal Reserve Bulletin* 79, pp. 601-630.

Shaffer, Sherrill, 1998, "The Winner's Curse in Banking," *Journal of Financial Intermediation* 7 (4), October, 359-392.

Shaffer, Sherrill, 1999, "Adverse Selection, Market Structure, and Competitive Pricing in Bank Lending," *Proceedings of a Conference on Bank Structure and Competition,* Federal Reserve Bank of Chicago, May.

Strahan, P.E., and Weston, J., 1996, "Small Business Lending and Bank Consolidation: Is There Cause for Concern?" Federal Reserve Bank of New York *Current Issues in Economics and Finance* 2, Mar., pp. 1-6.

Sylla, Richard, John B. Legler, and John H. Wallis, 1987, "Banks and State Public Finance in the New Republic: The United States, 1790-1860," *Journal of Economic History* 47, pp. 391-404.

Thomas, Christopher R., 1991, "The effect of interstate banking on competition in local Florida banking markets," Working paper, University of South Florida.

U.S. Department of Agriculture, 1997, *Credit in Rural America*, Agricultural Economic Report No. 749. Economic Research Service, Washington, DC.

Walraven, N., 1997, "Small Business Lending by Banks Involved in Mergers," Finance and Economics Discussion Paper 97-25. Washington, DC: Board of Governors of the Federal Reserve System.

Whalen, Gary, 1995, "Out-of-state Holding Company Affiliation and Small Business Lending," Economic and Policy Analysis Working Paper 95-4, Comptroller of the Currency, Washington, DC.

Whitehead, David D., 1990, "Relevant Geographic Banking Markets: How Should They Be Defined?" *Federal Reserve Bank of Atlanta Economic Review*, January/February, 20-28.