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Local bank office ownership, deposit control, market structure, and economic growth

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Abstract

This paper tests empirical associations between banking market structure, banking regulation, and subsequent growth rates in local real per capita personal income. Our 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 with the possible exception of farm-dependent areas. These findings derive from empirical models that relate both short-run and long-run growth rates to geographic restrictions on bank activity, concentration in local banking markets, in-market versus out-of-market ownership of local bank offices, and in-market versus out-of-market control of local bank deposits.

JEL classification: G21; O4; R51
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1. 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 has increased

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(Berger et al., 1995). As the number of chartered banks in the U.S. fell from roughly 14,000 in 1973 to 8774 in 1998, the total number of bank offices rose from about 40,000 to 70,731 in the same period. The largest eight banking firms increased their share of total bank assets from 22% in 1988 to 36% in 1997. Banks with less than $100 million in assets (1994 implicit GDP deflator dollars) held 14% of bank assets in 1979 but only 7% by 1994. During the same period, banks with over $100 billion grew from 10% to 20% of total bank assets. These trends have accelerated in the past few years as interstate banking has phased in.

This restructuring has been fostered by technological advances, competitive forces, and regulatory and statutory changes. One major regulatory change has been the wholesale relaxation of geographic restrictions on banking activity. In 1960, 39 states imposed some limit on intrastate branching, with 19 states prohibiting 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. Some states 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% of banks (9200 of 13,964) were unit banks. This proportion decreased to roughly 50% by 1984 (7426 of 14,483) and to 33% (3279 of 9510) by 1996. In terms of total banking offices, the change is more dramatic. Unit banks represented about one quarter of all banking offices in 1973, about 15% in 1984, and about 5% by 1996.

The restructuring of U.S. commercial banking has raised questions concerning its economic consequences, both for the economy as a whole and for those businesses and areas most likely to bear adverse consequences disproportionately: 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 in that context as well. This paper focuses on the association between various measures of economic growth and the structure and location of bank ownership in local markets. The study represents a first empirical look at the impact of out-of-market bank ownership and local bank market concentration on per capita income growth rates. 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 results 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 with the possible exception of farm-dependent areas.

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 business people expect the current restructuring to harm their communities despite fairly compelling evidence that 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 popular

support for restrictions on banking activities. [1] Because of this background, we also present separate estimates for farm-dependent counties, as defined by the USDA. The results differ from those in other rural counties in ways that suggest an empirical basis for the traditional views.

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

1.1. Why local banks might be different?

Small, locally owned banks may behave differently from larger and nonlocally owned banks for a variety of reasons including superior access to local information, greater commitment to local prosperity, and size-related differences in technology (cost structure) or risk management. 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. Such factors, whether related primarily to bank size or to locational limits on the bank's charter, have implications for the behavior of small, local banks.

1.1.1. Superior access to local information

Many borrowers, especially small businesses, are informationally opaque – their financial condition is not easy to assess or monitor. Researchers have long characterized bank lending as information intensive, relying on privately developed data and analysis (Leland and Pyle, 1977; Diamond, 1984) to assess loan requests and to monitor borrowers' financial condition and performance. Because the cost of these activities are related to distance, the location of a bank's offices relative to its borrowers may be important. For example, deposit and transaction accounts can provide low-cost financial data valuable for assessing loan requests and monitoring borrowers (Black, 1975; Berger, 1999). Since deposit relations are largely local, they strengthen the likelihood that locally active banks will have an informational advantage over other lenders.

[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 consolidating branches across state lines. This ruling caused the Texas Commissioner of Banking to nullify rules prohibiting interstate branching since they competitively disadvantaged state chartered banks.

1.1.2. Greater commitment to local prosperity

One premise of geographic restrictions on bank activity is that tying the fortunes of banks to specific locations will increase their commitment to sustaining local economic prosperity. Calomiris (1993) argues that established middle-class agricultural interests have historically favored entry restrictions because location-specific bank capital impedes the shifting of bank lending to more lucrative locations in the short run, thereby providing some measure of local loan insurance. Location-specific agricultural wealth is protected since the location-specific bank charters induce continued lending in an area even on reduced collateral values, mitigating downward movements in property values and in borrowers' ability to repay. Thus, location-specific banks provide a safety net in the short run, even though in the long run they may prove vulnerable to occasional severe marketwide shocks.

1.1.3. Differences in technology, costs, and risk management

Besides tying banks to local prosperity, geographic 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.

Cole et al. (1999) and Haynes et al. (1999) present evidence that "relationship lending" is more prevalent at smaller banks while "transaction-based" lending dominates larger banks. Relationship lending relies on privately developed, idiosyncratic information from a variety of sources including financial relationships outside the loan contract. Transaction-based lending relies on more easily obtained information such as financial statements and collateral quality when the loan application is processed. Berger (1999) argues 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 – an important source of funding for such loans. [2]

Smaller banks are more likely than larger banks to fund loans by local deposits rather than by nonlocal, nondeposit liabilities (USDA, 1997). In part, this pattern reflects agency problems: correspondent banks may be unwilling to accept loans originated by small banks as collateral or to extend liquidity to small banks during periods of tight monetary policy. Kashyap and Stein (2000) argue that small banks are more vulnerable to contractions in the money supply through the drying up of

[2] However, Freddie Mac, Farmer Mac, and GNMA securitize some types of generally well collateralized or documented loans bundled across multiple lenders, including small lenders. Also, smaller banks can often achieve economies through outsourcing a variety of functions.

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, along with more limited opportunities to diversify, may help explain the lower proportion of assets held in loans and the greater proportion held in securities by small banks (Houston and James, 1998).

1.1.4. Protection from competition

Some protection from competition was an explicit part of geographic limits on banking. In the U.S., state governments originally granted bank charters that included both limited liability and the right to issue money in return for revenue or other fiscal advantages. After the constitutional ban on issuing fiat money and taxing interstate commerce, many states derived a significant share of their revenue from banking (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. The next section discusses the pricing behavior of banks in such protected markets.

1.2. Geographic liberalization, consolidation, and bank behavior

A large literature has studied the impact of restructuring on various measures of bank performance including 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 (Berger et al., 1999). We review the portion of this literature that directly addresses major rural concerns: market power, lending to small business and agriculture, and small banks' competitiveness.

1.2.1. 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 be favorably associated with market concentration (Broecker, 1990).

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 been generally 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 when rates rose than when they fell (Hannan and Berger, 1991; Neumark and Sharpe, 1992; Hannan, 1994; Jackson, 1997). Finally, Prager and Hannan (1998) find that banks involved in mergers that violate Department of Justice safe harbor guidelines paid lower rates on deposits after the merger. [3]

Despite this association between local measures of concentration and prices, some evidence points to a decrease in market power over time. A priori, one might expect that markets for banking services are increasingly contestable, in part because the removal of geographic restrictions lowers barriers to entry in local markets. [4] New delivery alternatives and changes in consumer behavior (ATMs, telephone banking, internet banking, and increased use of credit and debit cards) may also increase the geographic span of bank activities, even though surveys of banks' customers have not hitherto found electronic banking to be a major factor in accessing distant banks. 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 1990s, consistent with low market power (Hannan, 1998).

1.2.2. Consolidation and the availability of services to small business and agriculture

Large banks historically have lent proportionately fewer assets to small business (Berger et al., 1995; Berger and Udell, 1996; Peek and Rosengren, 1996; Strahan and Weston, 1996; Cole et al., 1999). Since rural businesses tend to be small and reliant on local banks, this pattern might suggest that bank consolidation could reduce the credit available to small businesses. Indeed, larger banks 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). On the other hand, the same pattern may also reflect the relative inability of small banks to make large business loans. [5]

[3] A merger violates the guidelines if it results in a Herfindahl–Hirschman Index over 1800 with an increase over 200. The HHI is the sum of squared market shares of all market participants times 10,000.

[4] On the other hand, economic barriers to entry may be relatively unchanged. In that case, if the economic barriers are binding, the relaxation of legal barriers to entry would have little or no effect on contestability.

[5] In recognition of the need for diversification, banks are subject to strict legal lending limits relative to equity capital. However, loan participations provide a mechanism whereby banks can circumvent lending limits at a cost.

Countervailing forces imply that consolidation is not uniformly bad for small borrowers and, indeed, empirical evidence indicates little cause for concern except for transitional disruptions. While large bank mergers have often reduced small business lending, Peek and Rosengren (1998) and Strahan and Weston (1996) point out that most consolidations involving small banks actually increase small business lending. In rural areas, mergers among small and medium sized banking organizations have been more prevalent than in metropolitan areas.

Bank consolidation can also improve services to small customers during economic downturns since large, complex banks are likely to be better diversified (Calomiris, 1993; 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 (2000) 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 internally coordinated capital markets.

Among studies focusing on lending to agriculture, Laderman et al. (1991) find that after introduction of statewide branching, rural banks decrease (but urban banks increase) their share of agricultural loans. Bank asset diversification benefits agriculture by reducing credit disruption from bank failure. Gilbert and Belongia (1988) find that an increase in acquisitions by large banking organizations (those with assets greater than $1 billion) would reduce the supply of agricultural credit through commercial banks. They attribute the difference in large and small bank behavior to diversification constraints faced by small banks.

The effects of consolidation on the behavior of other small business lenders can also be important, as secondary effects appear to offset much or all of the adverse direct effect (Berger et al., 1998). De novo 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 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 banks with a local physical presence, the impact of consolidation on branch offices could also be important. Research on this subject is somewhat mixed concerning rural access. Avery et al. (1999) find that mergers within the same zip codes reduce the number of branches per capita, but other mergers have little effect. Evanoff (1988) finds that limited branching enhances access to bank services in rural counties but statewide branching does not, compared with unit banking. Both limited and statewide branching boost service in metropolitan areas. However, Gunther (1997) finds that many types of geographic liberalization are associated with stronger growth in the number of bank offices in rural areas.

1.2.3. Small bank competitiveness

If small banks are less than fully competitive with large banks, the latter could exercise greater market power in smaller rural banking markets. 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.

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

Whalen (1995) focuses on the competitiveness of local and nonlocal banks in financing small business. He finds 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 charge less for small business loans in his sample, their marginal costs are 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.

In contrast to earlier studies, recent research indicates that large banks may benefit from scale and diversification. Berger and Mester (1997) estimate significant economies of scale (up to 20% of costs) for banks with up to $25 billion in assets. They suggest that such large potential cost savings could arise from lower open market interest rates, technological progress, or regulatory changes such as geographic liberalization. McAllister and McManus (1993) find scale efficiencies from diversification for banks up to $1 billion in assets. Hughes et al. (1999) find that when size increases in a way that brings geographic diversification – for example, through interstate banking – efficiency tends to be higher and insolvency risk tends to be lower.

1.3. 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 its 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 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. [6]

In recent years, researchers have found increasing support for the hypothesis that financial development precedes and facilitates economic growth. King and Levine (1993a) present cross-country evidence consistent with Schumpeter's view that financial systems can promote long-run growth. They find the predetermined component of financial development to be robustly correlated with future rates of economic growth for three alternative measures of economic growth. King and Levine (1993b) explore the mechanisms through which financial systems affect economic growth. They suggest that financial sector distortions reduce growth by reducing the rate of innovation and present evidence consistent with the hypothesis that financial systems are important in spurring productivity growth and economic development.

Levine (1998) examines the relationship between the legal system, banking, and economic development. Again, he finds the exogenous component of banking development is correlated positively and robustly with measures of economic growth. Levine and Zervos (1998) find 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. Rajan and Zingales (1998) show that firms that are more dependent on external finance grow faster in countries with better-developed financial sectors. They suggest that by reducing the cost of external finance for such firms, financial development plays an important, beneficial role in the rise of new firms.

Jayaratne and Strahan (1996) explore the relationship between the banking sector and economic growth in the context of the liberalization of branching restrictions by U.S. States. They provide evidence that real per capita growth rates, of both personal income and gross state product, increase significantly following intrastate branching reforms.

2. Models and estimation

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 standard empirical models. We also test for differences in these relationships in metropolitan versus nonmetropolitan areas.

[6] At the same time, economic growth is likely to be affected by a larger number of exogenous forces than are bank-specific variables, compounding the challenge of controlling for other effects.

Following Jayaratne and Strahan (1996) – hereafter J&S – we model the short-run impact of changes in geographic regulations on local economic growth. We extend their model to consider the impact 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,b) and others, we model the average long-run annual growth rates as a function of both ex ante and contemporaneous measures of financial structure and a series of control variables.

We estimate each model separately for metropolitan and nonmetropolitan markets. In keeping with conventional practice in bank structure research, as well as in regulatory policy analysis, we define local markets as metropolitan statistical areas (MSAs) 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 datasets and over time by using the 1993 definitions of MSAs exclusively. Rural banking markets are defined as counties not included in MSAs. For consistency with previous research, we exclude Alaska and Hawaii from our short-run models but not our long-run model. We aggregate each of Virginia's independent cities with its surrounding county, and aggregate certain counties in Montana and Wisconsin for which treatment is not uniform across agencies. This process yields 2258 (2270 for the long-run model) rural banking markets and 267 (269) urban banking markets comprizing 827 (829) urban counties. We use data from years 1981–96 to estimate our short-run models and from 1973, 1984, and 1996 for our long-run model. Because of agricultural shocks in the 1980s, we also estimate farm-dependent counties as a separate regression, using county typologies developed by the USDA (Cook and Mizer, 1994). [7]

Table 1 summarizes the definitions and sources of our data and Table 2 presents descriptive statistics. The rate of growth increased markedly in nonmetropolitan markets from barely 0.25% per year during 1973–84 (arithmetic average) to more than 1% per year during 1984–96. Likewise, income growth accelerated in metropolitan markets from about 1% per year during 1973–84 to 1.4% per year during 1984–96, but exceeded that in nonmetropolitan markets in both periods.

Compared to metropolitan markets, nonmetropolitan markets on average have 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 megalopoli as New York, Los Angeles, and Chicago.

Nonmetropolitan markets have undergone geographic liberalization at a slower pace, and entry by nonlocal banks has been less likely once liberalization has occurred. Fig. 1 graphs the respective rates of liberalization and entry into metropolitan and nonmetropolitan markets (see also Amel and Liang, 1992, 1997). This

[7] USDA defines counties as farm-dependent if farm income averages more than 20% of total income from 1987 to 1989. About one quarter of nonmetropolitan markets qualify as farm dependent.

Table 1
Variables used in long-run model (4) 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 bank. 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 four 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: Bureau of Economic Analysis.
LRPCPI	Log of real per capita disposable income (in thousands) in market. Source: Bureau of Economic Analysis.
HHI	Initial market level (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 data from the Bureau of Economic Analysis.
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).

Table 2
Metro and nonmetro sample statistics

Variable	Metro (4272 observations)		Nonmetro (36128 observations)	
	Mean	Std. dev.	Mean	Std. dev.
Short-run model variables (1981–96)				
Y_t/Y_{t-1}	1.0143	0.024	1.0158	0.074
NIB	118.02	281.899	5.52	5.048
NXB	34.30	75.040	2.36	4.175
IDEPS (in millions)	4046	14,081	94	98
XDEPS (in millions)	781	2452	34	68
DMA	0.688	0.463	0.583	0.493
DNOVO	0.520	0.500	0.369	0.483
HHI	0.1779	0.0793	0.4190	0.2378

Variable	Nonmetro, 1973–84 (2265 observations)		Nonmetro, 1984–96 (2265 observations)		Metro, 1973–84 (260 observations)		Metro, 1984–96 (264 observations)	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Long-run model variables								
GY	0.00248	0.0164	0.0108	0.0112	0.00982	0.00657	0.0141	0.00589
NIB	4.710	4.178	5.822	5.1179	54.404	73.244	97.693	181.898
NXB	0.983	2.4917	1.795	3.884	8.173	19.416	20.655	38.638
XTB	0.167	0.3259	0.206	0.3365	0.151	0.274	0.222	0.289
DIB	1.853	3.1724	1.130	1.1289	3.429	9.546	4.218	8.704
DXB	3.369	11.5616	12.242	20.9597	30.754	99.440	60.345	142.852
DDEP	0.042	0.183	0.191	0.2892	0.0723	0.1568	0.2179	0.245
DPC	2.32	1.0421	6.450	3.2101	2.365	0.6608	5.6113	2.162
LEDU	−2.8255	0.4136	−2.3462	0.3538	−2.2715	0.3263	−1.8785	0.2988
LPOP	9.5292	0.9214	9.6248	0.9424	12.3689	0.9331	12.5807	1.0172
LRPCPI	2.2593	0.2701	2.2862	0.2015	2.3563	0.1484	2.4663	0.1547
HHI	0.4727	0.261	0.4404	0.2407	0.2203	0.0935	0.1957	0.0789
FM	0.245	0.4302	0.245	0.4299				
MI	0.064	0.2448	0.064	0.2448				

pattern is consistent with Calomiris (1993) work on the political economy of geographic restrictions in banking. Despite these observations, the percent of local offices (27% versus 29%) and deposits (26% versus 28%) controlled by out-of-market banks are surprisingly similar in nonmetropolitan and metropolitan markets.

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 versus out-of-market controlled deposits.

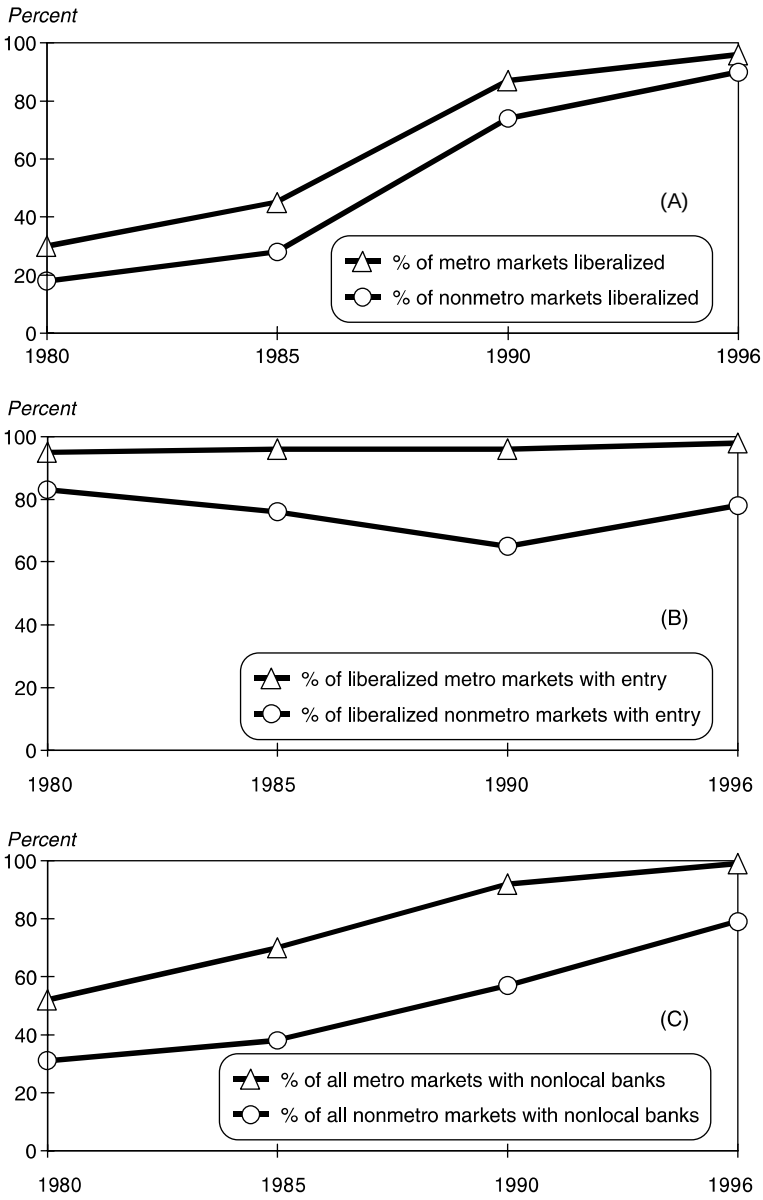

Fig. 1. (A) Metropolitan banking markets liberalized earlier than nonmetropolitan banking markets (B) Nonlocal entry occurred sooner after liberalization in metropolitan banking markets (C) Relatively fewer nonmetropolitan banking markets with nonlocally owned bank offices.

2.1. Short-run economic growth and market structure, ownership, and deposit control

We first estimate the following model:

$$Y_{t,i}/Y_{t-1,i} = \alpha_t + \beta_i + \gamma_1 \mathrm{DMA}_{t,i} + \gamma_2 \mathrm{DNOVO}_{t,i} + \delta_1 \mathrm{HHI}_{t,i} + \delta_2 \mathrm{NIB}_{t,i} + \delta_3 \mathrm{NXB}_{t,i} + \delta_4 \mathrm{IDEPS}_{t,i} + \delta_5 \mathrm{XDEPS}_{t,i} + e_{t,i}, \quad (1)$$

where $Y_{t,i}$ equals real per capita personal income during year t in local market i, $\mathrm{DMA}_{t,i}$ is a binary variable equal to 1 for markets in states that allow unrestricted branching through mergers and acquisitions in year t, and DNOVO is a binary variable equal to one for markets in states that allow unrestricted de novo branching in year t. HHI is the Herfindahl–Hirschman index of bank deposits, which is the sum of squared market shares for all market participants. To control for in-market and out-of-market ownership of bank offices and control of bank deposits, we include 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). As in J&S, β_i represents the state-specific component of long-run economic growth; α_t represents the common, economywide shock to growth at time t; and $e_{t,i}$ is an error term with the usual properties.

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:

Hypothesis 1

(a) Short-run, 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).
(b) Local growth is independent of bank deposit market concentration ($\delta_{1,j} = 0$).
(c) Local growth is independent of the number of local bank offices ($\delta_{2,j} = \delta_{3,j} = 0$).
(d) 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 is the same. That is, we test whether the relationship of growth to nonlocally owned offices or nonlocally owned deposits is the same as that to locally owned bank offices or locally owned deposits.

(e) The locus of local bank office ownership (in-market or out-of-market) is irrelevant to local growth ($\delta_{2,j} = \delta_{3,j}$).
(f) 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 Shweikart, 1989; Evanoff, 1988; Gunther, 1997).

There are reasons to expect violations of OLS assumptions in our data, especially with respect to multicollinearity and heteroskedasticity. Of particular concern are the high 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). We test for multicollinearity using the condition index. Standardizing the data to mean zero and unit variance brings nearly all condition indices below 10, indicating no major problem with statistical dependencies. [8] 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. J&S give three reasons for applying such weighting: (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 raise the variability of their growth rates. We too find that weighted least squares substantially improves the fit of our models.

Given the level of disaggregation of our data, we are also concerned about outliers and influential observations. We test for influential observations using Cook's D-statistic (Cook, 1977). We also remove a small number of outlier observations whose regression errors are more than 50% greater in absolute value than the next greatest absolute error. (Similar tests and adjustments were also made in the long-run model reported below.)

Table 3 presents estimates for the short-run model weighted by total personal income in the local market. Over the period covered by our data, 1981–96, real per capita personal income grew at an average annual rate of 1.43% in metropolitan markets and 1.58% in nonmetropolitan markets. Our results suggest that geographic liberalization, including the effects of both liberalized mergers and acquisitions and of de novo entry, was associated with a statistically significant increase in growth rates of 88% in metropolitan markets and 56% in nonmetropolitan markets. The coefficient of HHI is significantly negative for metropolitan markets and for farm-dependent counties (Hypothesis 1(b)), indicating that more concentrated banking

[8] Moderate collinearity remains in model 3 between NIB and INDEPS and between NXB and OUTDEPS. Belsley et al. (1980) suggest the following relationship between the condition index and multicollinearity: A condition index around 10 indicates weak dependencies may be starting to affect the regression estimates. A condition index of 30–100 indicates moderate to strong collinearity. A condition index larger than 100 indicates 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.

Table 3
Estimates: short-run model

	Real per capita income growth (weighted by total personal income)								
	Obs.	Adj. R^2	NIB	NXB	IDEPS	XDEPS	DNOVO	DMA	HHI
Metro	4272	0.5705	2.5E−7	−9.0E−6	6.6E−8	−1.3E−7	0.0020	0.0102	−0.0120
			(0.14)	(1.84)***	(1.89)***	(−1.06)	(2.06)**	(9.78)*	(−2.34)**
Nonmetro	36128	0.1405	1.8E−4	2.1E−4	−7.5E−6	−1.5E−5	0.0014	0.0074	−0.0024
			(3.12)*	(2.24)**	(−2.94)*	(−2.95)*	(1.70)***	(8.92)*	(−1.37)
Farm-dependent counties	8847	0.1160	4.0E−4	3.4E−4	−6.7E−5	−2.2E−6	0.0068	−0.0120	−0.0129
			(0.68)	(0.44)	(1.79)***	(−0.08)	(1.50)	(−2.91)*	(−2.12)**

t-statistics appear in parentheses. Two tailed significance levels: *0.01, **0.05, ***0.10.

markets are associated with slower growth in real per capita personal income on average in those areas. This result is consistent with previous research on bank market performance and concentration (Berger and Hannan, 1989, 1997; Hannan, 1991, 1994; Hannan and Berger, 1991; Neumark and Sharpe, 1992; Jackson, 1997). However, concentration does not exhibit a significant effect in nonfarm-dependent nonmetropolitan markets. [9]

The significance of the coefficients on DMA and DNOVO indicates that changes in market structure and local bank ownership or local deposit control are not the important avenues through which geographic liberalization impacts 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 impact local economic performance. Statistical hypothesis tests (Table 5) indicate that bank office numbers, bank deposits, and deposit market concentration jointly have a statistically significant association with local economic growth (Hypothesis 1(a)) in both metro and nonmetro markets. Individually, deposit market concentration maintains its statistically significant negative association with local economic growth (Hypothesis 1(b)) in metro but not in nonmetro markets. *F*-tests indicate that the number of bank offices (Hypothesis 1(c)) and the amount of bank deposits (Hypothesis 1(d)) 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 (Hypothesis 1(e)) or control of bank deposits (Hypothesis 1(f)) affects these associations. There is, however, weak evidence that local growth in metropolitan markets is more negatively associated with out-of-market bank office ownership than in-market ownership (Hypothesis 1(e)).

2.1.1. 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 re-estimate the model for farm-dependent rural counties. Results from this estimation are presented alongside other results in Tables 3–5.

The results for farm-dependent counties differ in striking ways from those for other rural or urban banking markets, lend support to Calomiris' 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 short-run models indicate that reduced growth is associated with geographic liberalization in farm-dependent markets. In addition, the negative association between deposit market concentration and growth is stronger in farm-dependent markets than in other

[9] For comparison, J&S, using 1015 state-level observations from 1972–92 and a model that included only time and state fixed effects and DMA, estimated a coefficient on DMA of 0.0094 (OLS) and 0.0119 (WLS), both statistically significant at the 1% level. Thus, our results are quantitatively and qualitatively similar to earlier findings, but indicate a stronger impact in metropolitan and farm-dependent markets than in nonfarm-dependent nonmetropolitan areas, in both absolute and relative terms.

Table 4
Estimates from long-run model

	Real per capita personal income growth (weighted by total personal income)					
	Metro		Nonmetro		Farm dependent	
	1973–84	1984–96	1973–84	1984–96	1973–84	1984–96
Obs.	260	264	2265	2265	555	554
Adj. R^2	0.3107	0.3058	0.5223	0.2434	0.5748	0.3842
Intercept	0.0514	0.0442	0.0721	0.0829	0.1690	0.0893
	(4.58*)	(4.36*)	(11.51*)	(13.95*)	(9.71*)	(6.00*)
NIB	−1.54E−6	4.21E−6	−4.28E−5	2.33E−4	0.0010	1.70E−4
	(−0.30)	(3.09*)	(−0.86)	(5.85*)	(4.02*)	(0.80)
NXB	8.36E−6	−9.58E−6	1.26E−4	2.09E−4	9.32E−4	−0.0012
	(0.48)	(−1.53)	(1.46)	(4.36*)	(2.64*)	(−4.45*)
XTB	−0.0037	−0.0044	−0.0035	0.0011	−0.0028	0.0011
	(−1.56)	(−2.29**)	(−3.21*)	(1.18)	(−1.09)	(0.46)
DDEP	0.0056	−0.0028	−7.34E−4	2.20E−4	−0.0056	−0.0013
	(2.43**)	(−1.85***)	(−0.59)	(0.28)	(−1.22)	(−0.58)
DIB	−6.1E−5	1.11E−5	8.64E−5	5.74E−4	7.02E−4	2.95E−4
	(−2.63*)	(0.56)	(1.76***)	(4.54*)	(3.53*)	(0.64)
DXB	4.53E−7	−4.27E−6	2.65E−5	2.06E−5	−1.78E−5	7.60E−7
	(0.18)	(−3.08*)	(2.19**)	(2.52**)	(−0.11)	(0.02)
LPOP	0.0017	0.0011	0.0025	−9.91E−4	−0.0039	0.0012
	(2.78*)	(2.35**)	(5.43*)	(−2.23**)	(−2.87*)	(1.04)
LEDU	0.0088	0.0032	0.0041	0.0039	0.0061	4.60E−4
	(6.62*)	(2.15**)	(8.01*)	(7.65*)	(3.60*)	(0.26)
LRPCI	−0.0187	−0.0150	−0.036719	−0.0234	−0.0573	−0.0388
	(−5.70*)	(−4.46*)	(−31.44*)	(−19.69*)	(−24.80*)	(−14.05*)
DPC	0.0014	−0.0004	0.001254	−9.77E−5	0.0030	5.81E−4
	(2.36**)	(−2.29**)	(4.14*)	(−1.06)	(4.46*)	(3.31*)
HHI	−0.0112	0.0133	−0.000851	−0.0011	−1.22E−4	−0.0087
	(−2.81*)	(3.09*)	(−0.64)	(−0.79)	(−0.03)	(−3.00*)
FM			−0.006594	−0.0022		
			(−10.05*)	(−3.63*)		
MI			0.002956	−0.0066		
			(3.64*)	(−9.65*)		

t-statistics appear in parentheses. Two tailed significance levels: *0.01, **0.05, ***0.10.

rural markets (Hypothesis 1(b)). 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 short-run growth rates.

2.1.2. Robustness

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 lagged independent variables in the short-run context, or initial as opposed to contemporaneous independent

Table 5
Hypothesis tests from weighted regressions

Hypothesis	Metro	Nonmetro	Farm dependent			
Short-run models						
1(a): $\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$, bank ownership and market structure	$F = 23.23^{*}$	$F = 5.05^{*}$	$F = 1.26$			
1(b): $\delta_{1,j} = 0$, concentration	$t = -2.34^{**}$	$t = -1.37$	$t = -2.12^{**}$			
1(c): $\delta_{2,j} = \delta_{3,j} = 0$, office ownership	$F = 1.71$	$F = 6.98^{*}$	$F = 0.34$			
1(d): $\delta_{4,j} = \delta_{5,j} = 0$, deposit control	$F = 2.11$	$F = 9.01^{*}$	$F = 1.65$			
1(e): $\delta_{2,j} = \delta_{3,j}$, office ownership differences	$F = 2.87^{***}$	$F = 0.06$	$F = 0.00$			
1(f): $\delta_{4,j} = \delta_{5,j}$, deposit control differences	$F = 2.22$	$F = 1.78$	$F = 1.59$			
Hypothesis	1973–84			1984–96		
	Metro	Nonmetro	Farm dependent	Metro	Nonmetro	Farm dependent
Long-run models						
2(a): $\beta_{1,j} = \beta_{2,j} = \beta_{3,j} = \gamma_{5,j} = 0$, growth independent of initial local bank market structure	$F = 3.77^{*}$	$F = 3.24^{**}$	$F = 5.58^{*}$	$F = 8.96^{*}$	$F = 13.56^{*}$	$F = 16.72^{*}$
2(b): $\gamma_{5,j} = 0$, growth independent of initial deposit market concentration	$t = -2.81^{*}$	$t = -0.64$	$t = -0.03$	$t = 3.09^{*}$	$t = -0.79$	$t = -3.00^{*}$
2(c): $\beta_{1,j} = \beta_{2,j} = 0$, growth independent of initial number of local bank offices	$F = 0.17$	$F = 1.58$	$F = 9.39^{*}$	$F = 4.95^{*}$	$F = 24.68^{*}$	$F = 12.23^{*}$
2(d): $\beta_{3,j} = 0$, growth independent of initial percent of out-of-market ownership	$t = -1.56$	$t = -3.21^{*}$	$t = -1.09$	$t = -2.29^{**}$	$t = 1.18$	$t = 0.46$
2(e): $\beta_{1,j} = \beta_{2,j}$, initial locus of ownership of bank offices irrelevant to growth	$F = 0.30$	$F = 3.14^{***}$	$F = 0.06$	$F = 4.09^{**}$	$F = 0.16$	$F = 22.22^{*}$
2(f): $\beta_{4,j} = \beta_{5,j}$, contemporaneous locus of ownership of bank offices irrelevant to growth	$F = 6.95^{*}$	$F = 1.46$	$F = 7.67^{*}$	$F = 0.61$	$F = 20.48^{*}$	$F = 0.45$
2(g): $\beta_{6,j} = 0$, contemporaneous locus of control of local bank deposits irrelevant to growth	$t = 2.43^{**}$	$t = -0.59$	$t = -1.22$	$t = -1.85^{***}$	$t = 0.28$	$t = -0.59$

t-statistics appear in parentheses. Two tailed significance levels: $^{*}0.01$, $^{**}0.05$, $^{***}0.10$.

variables in the long-run 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 macropolicies 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 the short-run model with lags of the independent variables related to bank ownership and market structure. Results in Table 6 indicate greater levels of statistical significance for lagged variables and associated hypotheses than for their contemporaneous counterparts in Tables 3 and 5. 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.

For farm-dependent counties, another concern with respect to omitted variables or joint causality can be raised. Many states liberalized geographic restrictions because of the wave of bank failures related to the agricultural recession of the 1980s. These states might have liberalized in a period when their farm economies continued to underperform. Fig. 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. [10]

An additional way to control for the effect of local business cycles is to add lagged dependent variables to the model. We found 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.

2.2. Long-run 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:

[10] Ironically, farm-dependent counties with liberalized branching perform less well than those with limited branching in relatively stable or prosperous periods.

Table 6
Short-run model (3) with lagged independent variables, weighed by total personal income

	Metro	Nonmetro	Farm dependent
Panel A: Estimates			
Obs.	4272	36128	8848
Adj. R^2	0.5681	0.1419	0.1160
NIB_{t-1}	5.5E−6	4.4E−4	5.1E−4
	(3.12)*	(6.45)*	(0.87)
NXB_{t-1}	−1.3E−5	3.6E−4	−6.3E−5
	(−2.68)*	(3.75)*	(−0.08)
$IDEPS_{t-1}$	−8.0E−8	−2.2E−5	−7.6E−5
	(−2.34)**	(−6.50)*	(−2.03)**
$XDEPS_{t-1}$	−5.0E−8	−2.7E−5	6.1E−6
	(−0.40)	(−5.08)*	(0.21)
DNOVO	0.0027	0.0014	0.0069
	(2.75)*	(1.76)***	(1.53)
DMA	0.0100	0.0071	−0.0120
	(9.50)*	(8.51)*	(−2.92)*
HHI	−0.0135	−0.0024	−0.0137
	(−2.63)*	(−1.38)	(−2.27)**
Panel B: Hypothesis tests with lagged independent variables			
1(a): $\delta_{1,j} = \delta_{2,j} = \delta_{3,j} = \delta_{4,j} = \delta_{5,j} = 0$, bank ownership and market structure	$F = 22.74$*	$F = 19.30$*	$F = 1.27$
1(b): $\delta_{1,j} = 0$, concentration	$t = -2.63$*	$t = -1.38$	$t = -2.27$**
1(c): $\delta_{2,j} = \delta_{3,j} = 0$, office ownership	$F = 7.01$*	$F = 26.89$*	$F = 0.38$
1(d): $\delta_{4,j} = \delta_{5,j} = 0$, deposit control	$F = 3.04$**	$F = 35.54$*	$F = 2.16$
1(e): $\delta_{2,j} = \delta_{3,j}$, office ownership differences	$F = 11.31$*	$F = 0.52$	$F = 0.33$
1(f): $\delta_{4,j} = \delta_{5,j}$, deposit control differences	$F = 0.05$	$F = 0.74$	$F = 2.60$
Panel C: Estimates with three lags of dependent variable			
Obs.	3738	31612	7770
Adj. R^2	0.5837	0.1908	0.2523
DMA	0.0103	0.0131	−0.0048
	(10.98)*	(16.70)*	(−1.46)
HHI	−0.0039	−0.0021	−0.0063
	(−0.76)	(−1.43)	(−1.39)

t-statistics appear in parentheses. Two tailed significance levels: *0.01, **0.05, ***0.10.

$$\begin{aligned}\overline{\mathrm{GY}}_{t_T,t_0} = {} & \alpha + \beta_1 \mathrm{NIB}_{t_0} + \beta_2 \mathrm{NXB}_{t_0} + \beta_3 \mathrm{XTB}_{t_0} + \beta_4 \mathrm{DIB}_{t_T,t_0} + \beta_5 \mathrm{DXB}_{t_T,t_0} \\ & + \beta_6 \mathrm{DDEP}_{t_T,t_0} + \gamma_1 \mathrm{DPC}_{t_0} + \gamma_2 \mathrm{LEDU}_{t_0} + \gamma_3 \mathrm{LPOP}_{t_0} \\ & + \gamma_4 \mathrm{LRPCPI}_{t_0} + \gamma_5 \mathrm{HHI}_{t_0} + e, \end{aligned} \tag{2}$$

where $\overline{\mathrm{GY}}_{t_T,t_0}$, 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 long-run linkage between bank concentration and ownership structure versus growth rates in income. By estimating the model for different time periods, we can also examine the

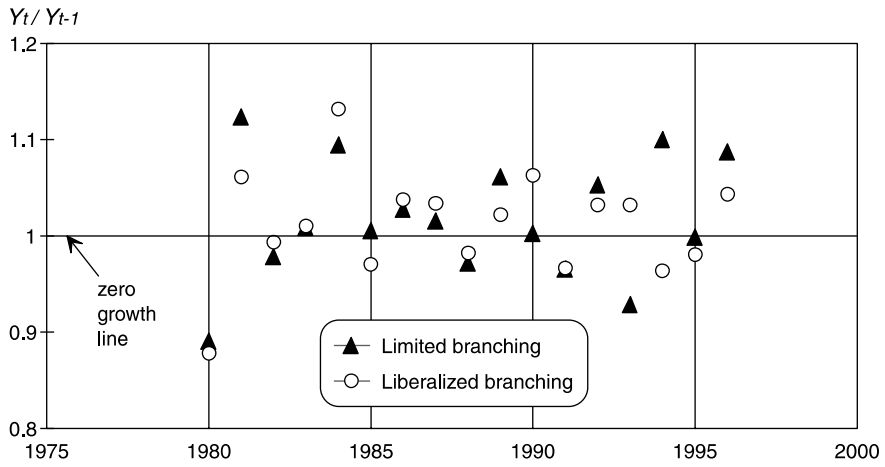

Fig. 2. Bank branching restrictions and real per capita income growth in farm-dependent rural counties, 1980–96. Vertical axis indicates 1+ real growth in per capita personal income. Therefore, a level of 1 on the vertical axis indicates zero real growth, below 1 indicates a decline, and above 1 indicates an increase over the previous year.

stability of the linkages over time. Similar to the short-run model above, our measures of market structure and ownership include the market-wide Herfindahl–Hirschman index (HHI) of deposits; 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 number 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 multimarket 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, 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 four 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. Separate regressions were fitted for rural counties alone, for farming-dependent counties alone, and for MSAs alone.

We test the following hypotheses, analogous to those tested with the short-run model:

Hypothesis 2

(a) Long-run 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).
(b) Long-run average growth rates of local real per capita income are independent of initial local bank deposit market concentration ($\gamma_{5,j} = 0$).
(c) Long-run average growth rates of local real per capita income are independent of the initial number of local bank offices ($\beta_{1,j} = \beta_{2,j} = 0$).
(d) Long-run average growth rates of local real per capita income are independent of the initial percentage of out-of-market ownership of bank offices ($\beta_{3,j} = 0$).
(e) Long-run 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 ($\beta_{1,j} = \beta_{2,j}$).
(f) Long-run average growth rates of local real per capita income are independent of contemporaneous changes in the locus of ownership of local bank offices ($\beta_{4,j} = \beta_{5,j}$).
(g) Long-run 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 ($\beta_{6,j} = 0$).

As in the short-run model, we performed both OLS and WLS estimates, tested for multicollinearity using the condition index, and tested for influential observations using Cook's D-statistic. The long-run model spans 1973–96 and is fitted as two consecutive nonoverlapping periods (1973–84 and 1984–96). The use of a single growth rate measured 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 the first half of the period than in the second. 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 multiyear period. Other federal

laws that further deregulated various aspects of banking were passed during the 1980s. 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.

The estimates from models (4) are shown in Table 4 and results of hypothesis tests are presented in Table 5. In each case, the hypothesis that long-run average per capita income growth is independent of initial bank market structure is rejected (Hypothesis 2(a)), with greater statistical significance for both markets in the later period.

The initial number of in-market owned bank offices (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. Likewise, the initial number of out-of-market owned bank offices (NXB) is positively and significantly associated with subsequent growth in rural markets for 1984–96. These results are consistent with other empirical findings that more banks are associated with faster economic growth rates (see King and Levine, 1993a,b; Jayaratne and Strahan, 1996; Levine, 1998; Rajan and Zingales, 1998; Shaffer, 1998). However, NIB and NXB are not significant in the earlier period, nor is NXB significant in the later metropolitan sample.

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 (Hypothesis 2(b)). 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% of rural banking markets exceeds the Justice Department's guidelines of 1800 throughout the period.

The association between long-run average growth and the initial number of bank offices strengthens over time (Hypothesis 2(c)) 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 bank office ownership (Hypothesis 2(e)). The hypothesis that the association between long-run 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. [11]

[11] For the metropolitan sample in the later period, an increase of 182 bank offices (equal to one standard deviation of the sample values of NIB) is associated with an increase in subsequent income growth rates of less than 0.6% point per year (only 0.13 of the sample standard deviation of income growth). The absolute impact of NXB is even smaller and is statistically insignificant.

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 (Hypothesis 2(d)) is negative in all but one case, and statistically significant for rural markets in the earlier period and for urban markets in the later period. 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 out-of-market owned bank offices in metropolitan markets in 1984 is 0.09% points per year, or 6% of the expected average annual growth over the subsequent 12 years.

To this point, we have examined results relating initial conditions to subsequent long-run 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 out-of-market owned banks (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 later period but insignificant in the earlier period. For rural markets, the hypothesis that these two variables have equal coefficients (Hypothesis 2(f)) 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 in-market and out-of-market owned bank offices 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. Interestingly, where coefficients on these variables were significant, they took opposite signs in metropolitan (negative) versus nonmetropolitan (positive) markets.

Similarly, the contemporaneous change in the share of deposits controlled by out-of-market owned banks (DDEP) cannot be interpreted as providing information on the direction of causality. DDEP is not significantly related to long-run average growth (Hypothesis 2(g)) 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 short-run model (3) indicating no significant difference in the association between growth and control of deposits (Hypothesis 1(f)) in rural markets. [12] The lack of

[12] 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 long-run model for metropolitan markets is also consistent with those from the short-run model.

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 long-run growth and nonlocal ownership in metropolitan markets and an increasingly positive relationship between long-run 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 long-run average growth rates in local real per capita income in the earlier period, the more recent evidence is consistent with evidence from short-run models that, on average, no harm and some benefits may accrue from geographic liberalization and entry by out-of-market owned firms.

2.2.1. Farm-dependent counties

The estimates for farm-dependent counties indicate a relatively large, negative, and statistically significant association between the initial number of out-of-market owned bank offices and subsequent long-run 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 (Hypothesis 2(e)) is soundly rejected. Initial deposit market concentration also has a relatively large, negative, and statistically significant association with long-run average income growth in this period. Interestingly, initial market concentration was not significantly related to long-run 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 1980s, these results may indicate substantial differences in the commitment of nonlocal banks to local areas consistent with Calomiris (1993).

2.2.2. Robustness

It is a priori less likely that the variables representing initial conditions in the long-run 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 rarely attainable over horizons in excess of 10 years, as measured by our long-run growth variables. Moreover, the economic growth rates exhibit virtually no persistence from one decade to another for the average market in our sample. 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 an expanding market and hence an attractive market for bank entry; it is quite possible to observe growing per capita income even in a market with declining popula-

tion. 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.

3. 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. That research has focused on changes in loan portfolio size, allocation, and quality, operating efficiency, risk management, loan and deposit pricing, and small bank competitiveness following liberalization or bank consolidations. Extant results provide evidence that liberalization often affects bank behavior and that large banks often behave differently from small banks. However, that research does less to address the underlying issue of whether these differences are beneficial or detrimental to local economies.

Another line of research has found important positive linkages between financial market structure and economic growth, both internationally and domestically. This paper extends that line of inquiry by relating banking market structure and geographic regulation to economic growth at the local market level. A central issue is the distribution across metropolitan and nonmetropolitan areas of the previously documented relationship between geographic deregulation and state-level growth. Other key issues concern the impact of bank market concentration, out-of-market ownership of local bank offices, and out-of-market control of local deposits. We estimate separate long-run and short-run 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 popular support for restrictions on bank branching. The long-run models span two time periods: 1973–84, which largely predates liberalization in nonmetropolitan areas; and 1984–96, which coincides with increasing liberalization of geographic banking restrictions.

Our results indicate an important linkage between geographic liberalization and local growth in the short run. Estimates from model (1) of the total impact from liberalization (allowing both mergers and acquisitions and de novo entry) in metropolitan markets are 1.22% per year or 88% of expected growth rates. Nonmetropolitan markets exhibit a smaller but still important impact of 0.88% per year or 56% of expected growth rates. These results are qualitatively robust to different specifications, though the magnitudes depend somewhat on weighting or on the inclusion of lagged dependent variables. Controlling for market concentration and bank ownership structure does 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 short-run growth. In addition, while F-tests indicate that market structure is statistically

significant, the location of neither bank office ownership nor deposit control is statistically related to short-run growth in nonmetropolitan areas. However, in metropolitan areas, out-of-market ownership of bank offices is associated with lower short-run growth rates, but the magnitude of this effect is economically small.

Results from our long-run model generally support and enrich our short-run results. Two features are particularly striking. First, no evidence suggests that nonlocal banks are detrimental to local economic growth in rural areas in the more recent period. Second, the impact of nonlocal banks is more positive in rural areas in the later period compared to the earlier period, but the reverse is true of metropolitan markets.

Results from farm-dependent markets, however, show that these associations are not universal associations. In farm-dependent markets, liberalization is associated with a decrease in short-run growth, and higher initial levels of out-of-market bank ownership are associated with slower long-run growth in the more recent period. However, the short-run result is 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 local presence of banks of different asset sizes or of local headquarters of multimarket banks. 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.

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