ENTRY RESTRICTIONS, INDUSTRY EVOLUTION AND DYNAMIC EFFICIENCY: EVIDENCE FROM COMMERICAL BANKING

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Entry Restrictions, Industry Evolution and Dynamic Efficiency: Evidence from Commercial Banking*

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Abstract

This paper shows that bank performance improves significantly after restrictions on bank expansion are lifted. We find that profits increase and loan quality improves after states permit statewide branching, and--to a lesser extent--after states allow interstate banking. The improvements following branching deregulation appear to occur because better banks increase market share at the expense of their less efficient rivals. By retarding the "natural" evolution of the industry, branching restrictions reduced the performance of the average banking asset. We also find limited support for the hypothesis that more competitive banking markets following deregulation better discipline bank managers, thereby improving bank performance.

JEL Classification: G2, L5

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I. Introduction

How do price and entry regulations affect market structure, industry evolution, management quality, and through these, dynamic efficiency? Relatively little is known about this question. Data limitations have forced extant empirical studies of the impact of price and entry regulations to focus on changes in prices, profits and wages, and generally neglect dynamic issues of industry evolution and efficiency (Winston 1993).

In this paper, we look to the banking industry for evidence on the dynamic effects of entry regulation. The unique history of the regulation of commercial banking in the United States offers several advantages. First, banks were subjected to extremely severe entry barriers in the form of branching restrictions at a relatively early stage of the industry's development. Banks have traditionally been prevented from crossing state lines and, until the 1980s, they were unable to cross *county* lines in many states. As a result, the U.S. banking industry is extremely fragmented, with thousands of banks and bank holding companies. This structure contrasts sharply with other countries, where a few very large institutions dominate.

Second, geographic restrictions on banking have been gradually lifted over the past two decades. This allows us to use changes in banking once these restrictions are lifted to understand the effects of such restrictions. Moreover, because most branching restrictions were imposed by state regulators, and because states deregulated at different times, we are able to use states which did not change their policy regimes to control for potentially confounding effects such as the business cycle. Pooling time series and cross sectional data also allows us to control for the effects of unmeasured differences across states.

Existing literature on the effects of bank branching restrictions suggests that these regulations limited banks' ability to diversify portfolio risks (Calomiris 1993, Demsetz and Strahan 1995) and increased market power (Rhoades 1982, Flannery 1984, Evanoff and Fortier 1988, Amel and Liang 1992).

Less is known, however, about the effects of branching restrictions on bank efficiency. The only hypothesis on this topic with empirical support is that industry efficiency may have been impaired by geographic restrictions because they vitiated corporate control markets by reducing the number of potential acquirers, thereby worsening agency problems between bank owners and managers. This may have contributed to increased costs and reduced profitability. Schranz (1993) finds that banks in states with strict restrictions on geographic expansion are less profitable than banks in states without such restrictions. Hubbard and Palia (1995) find that managers are paid more but their compensation is tied more closely to banks' performance in states that allow interstate banking. Hubbard and Palia interpret this as evidence of a more active takeover market and better disciplined management in states with interstate banking. However, they offer no evidence that banks improved their performance following interstate banking.

In this paper, we find that banks' performance -- profitability and loan quality -- improves sharply once restrictions on intrastate branching are lifted and, to a lesser extent, after interstate banking is permitted. We show that the observed performance improvement is not entirely the result of the timing of deregulation. If states deregulate during economic downturns, then following deregulation their banking systems may improve simply as a consequence of economic recovery. We account for this potentially spurious "correlation" between bank performance and branching deregulation by controlling for states' business cycles in our

regressions. Moreover, bank performance improves significantly after branching deregulation but not before, suggesting that causality flows from deregulation to improved performance rather than the reverse. (However, bank performance improves in the period immediately before interstate banking is allowed.)

We find some evidence that the improved bank performance following deregulation is due to better disciplined management. Takeover rates increase significantly following interstate banking, consistent with the disciplining hypothesis. Moreover, lending to bank insiders, a significant indicator of management consumption activity, decreases substantially following branching deregulation.

We find stronger evidence that branching deregulation triggered a process of selection, whereby better performing banks expand at the expense of high-cost, low-profit banks. Although better-performing banks grow faster than under-achievers before intrastate branching is allowed, we find that low-cost, high-profit banks grow even faster once branching restrictions are lifted. This suggests that branching restrictions imposed binding constraints on the ability of better-managed banks to grow. Once these restrictions were lifted, better banks expanded at the expense their poorly-managed rivals, thereby improving efficiency and profitability of the average bank asset.

On balance, the changes in banking after deregulation of geographic restrictions suggest that these restrictions allowed inefficient banks to survive and worsened agency problems between owners and management, thereby lowering the quality of the average bank and of banking intermediation in the economy. The extensive literature on the importance of bank intermediation implies that the real economy may have suffered as a result. This conjecture is

confirmed in Jayaratne and Strahan (1996), who find that states' growth rates decreased as a result of branching restrictions.

The rest of the paper is organized as follows. Section II briefly summarizes the legislative history of intrastate branching and interstate banking. Section III describes the empirical methods and presents our estimates of improved banking performance. Section IV provides evidence supporting both the disciplining and selection hypotheses. Section V concludes.

II. Recent history of interstate banking and intrastate branching

Interstate banking was effectively prohibited by the Bank Holding Company Act of 1956. The Douglas Amendment to that Act prohibited bank holding companies from establishing or purchasing bank subsidiaries across state lines unless the target bank's state authorized it. Since no state allowed such transactions at the time, the 1956 Act prevented interstate banking. In 1978, Maine permitted out-of-state bank holding companies (BHCs) to buy Maine banks. By 1992, the end of the sample period used in this paper, all states but Hawaii had entered an interstate banking agreement with other states.

Many states allowing interstate banking also limited the extent of entry by out-of-state BHCs in several ways. For example, fifteen states and Washington, D.C. allowed entry only by BHCs headquartered in selected states. The restrictions attached to interstate banking may have limited the extent of interstate activity, but they have not prevented a sharp increase in such activity. The percentage of deposits held by subsidiaries of out-of-state BHCs in the typical state expanded from 2 to 28 percent between 1979 and 1994 (Berger, Kashyap and Scalise, 1995). Moreover, banks appear to demand more from management following interstate banking;

Hubbard and Palia (1995) find a stronger pay-performance relation for CEOs and greater CEO turnover rates in states with interstate banking.

In addition to prohibiting interstate banking, most states entered the 1970s with restrictions on bank branching within state borders. For example, Florida prohibited branch banking entirely until 1977, when banks were allowed to branch within the county where their main offices were located. In 1988, Florida permitted branching statewide. Only 13 states allowed unrestricted intrastate branching in 1974. During the next two and a half decades, 35 states and Washington, D.C. substantially eliminated restrictions on intrastate branching. By 1992, all but three states allowed some form of statewide branching.

Many states had allowed banking companies to expand within the state by forming multi-bank holding companies (MBHCs) long before they allowed branch banking. If the MBHC structure allowed banks to grow optimally without branching, we would expect branching to have had little impact. MBHCs are more costly to operate than branch banks, however, because they require multiple boards of directors and separate capitalization of each bank subsidiary. The high cost of the MBHC structure is confirmed by the fact that many multibank holding companies converted their bank subsidiaries into branches once branching was allowed (McLaughlin 1994). Other research also indicates that branch banking had important effects on the structure of banking markets. Amel and Liang (1992) find significant entry into local markets after intrastate branching restrictions are lifted via de novo branching. Calem (1994) finds that small banking companies lose market share after branching reform.[1]

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[1] Moore (1996) questions whether the decline in small banking companies is the result of branching deregulation. He shows that the rate of decline in small banking company market share does not accelerate after deregulation.

Table 1 describes the history of the deregulation of restrictions on intrastate branching and interstate banking since 1970.[2] The first column presents the year in which each state permitted branching via merger and acquisition (M&A) through the holding company structure. The second column presents the date at which each state first permitted interstate banking. The dates chosen in Table 1 reflect the time at which each state finished the branching deregulation process.[3] These choices in some cases require judgment, since some states deregulated gradually over time. In four cases we chose dates earlier than the literal end of the process of deregulation since we felt that the remaining restrictions no longer imposed a meaningful constraint on branching.[4]

In addition to the two types of deregulation listed in Table 1, two more sets of geographic restrictions were also lifted by states after 1970. The intrastate branching deregulation dates listed in Table 1 are the dates when states allowed banks to expand statewide by acquiring another bank's branch or by acquiring a whole bank and converting it into branches (M&A branching). However, de novo branching -- where a new branch is established -- was often

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[2] We exclude Delaware and South Dakota from our analysis because these two states created incentives for credit card banks to locate there.

[3] Dates for deregulation of both branching restrictions and restrictions on interstate banking are taken from Amel (1993).

[4] For instance, in 1982 Pennsylvania began permitting banks to branch in the home office county, in a contiguous county, in a bicontiguous county or in the counties of Allegheny, Delaware, Montgomery and Philadelphia. In 1990, Pennsylvania permitted unrestricted branching statewide. In the results presented below, we assume that by 1982 Pennsylvania permitted intrastate branching, despite the fact that the process was not finished until eight years later, since the effect of the 1982 law brought Pennsylvania so close to complete intrastate branch freedom. We follow a similar practice for the states of Ohio, Virginia and Washington. Our results are not sensitive to the alternative dating of deregulation in these four states.

prohibited even after M&A branching was allowed. Typically, states allowed de novo branching a few years after they allowed M&A branching. In this paper, we focus only on M&A deregulation because de novo branching occurred too soon to separate out its effects from those of M&A branching.

Another type of geographic restriction not examined here are the restrictions placed on the BHC expansion within states. Illinois, for example, prohibited multi-bank holding companies in 1957. However, most states did allow intrastate MBHC expansion. By 1975, the beginning of our sample period, 35 states allowed MBHC expansion within each state. Of the fifteen remaining states, all but Rhode Island relaxed MBHC restrictions between 1975 and 1992. We do not examine intrastate MBHC deregulations partly because there were so few of them, and partly because most of these states relaxed MBHC restrictions at about the same time as they relaxed branching restrictions, making it difficult to separate the effects of MBHC deregulation.

III. Deregulation and bank performance

As explained at the outset, we are interested in using changes in profits and loan quality following deregulation to infer what effect restrictions on geographical expansion had on the efficiency of the banking system. Limits to bank expansion could have reduced efficiency in the industry for at least two reasons. First, in an environment in which banks cannot easily branch into new markets, the growth opportunities available to the better managed banks are artificially constrained. After these constraints are lifted, better banks can expand at the expense of poorly-managed banks, thereby improving the overall efficiency of the banking system. According to this selection hypothesis, the average quality of banking will improve after deregulation because the better-run, more efficient banks gain market share relative to their less efficient competitors.

Second, limits to branching and mergers and acquisitions across state lines may exacerbate owner-manager agency problems both by reducing the threat of a takeover and by limiting competition. Managers of banks in regulated states may invest in negative net-present value projects, either because they exert less effort in loan screening and monitoring or because they earn utility from some unproductive loans. After deregulation, these managers may be forced to increase shareholder value either to avoid takeovers or to protect against the loss of market share to more efficient competitors. According to this disciplining hypothesis, the banking system improves because managerial effort increases for all banks.

A. Measures of banking performance

To test for these conjectured effects of geographic restrictions, we first examine how aggregate measures of bank profitability and bank loan quality change following deregulation. We rely here on state-level aggregate data rather than bank-level data because we want to test for the possibility that, following deregulation, a selection mechanism weeded out less efficient banks. Such a conjecture cannot be tested easily by examining the effects of deregulation on individual banks since we would be restricted to a sample of surviving banks, which biases any tests. Aggregate data on the banking industry as a whole would capture any selection process as well as possible disciplining effects. We analyze bank-level data in the following section to test between the conjectured selection and disciplining hypotheses.

We measure profitability by return on assets (net income divided by total assets) and return on equity (net income divided by book value of equity). Net income, assets and book value of equity are aggregated to the state level by summing across all commercial banks operating in a given state. The dependent variable equals the total net income of all banks in a

state divided by the total assets (or equity) of all banks in that state. These data are taken from year-end *Quarterly Reports of Condition* for 1975 to 1992.

We examine four measures of loan quality. First, we use the fraction of total loans classified as "non-performing."[5] End-of-year non-performing loan amounts for all banks over the 1982 to 1992 period are taken from *Quarterly Reports of Condition*. A state-level aggregate non-performing loan amount is derived by summing over all banks in each state. The final variable of interest is the ratio of non-performing loans to total loans held by all banks in each state.

Our second loan quality indicator is the fraction of loans written off during the year. Net charge-offs (gross charge-offs less recoveries) for individual banks are again taken from end-of-year *Quarterly Reports of Condition* over the 1976-1992 period. State-level total charge-offs are derived, and the dependent variable is the ratio of charge-offs to total loans.

Third, we use the flow of loan loss provisions during the current year divided by total loans, again aggregated up to the state level. Loan loss provisions, like non-performing loans and charge-offs, should be higher at banks with poorer loan quality.[6]

Finally, we look at loans to insiders as our last measure of loan quality. "Insider loans" are defined as extensions of credit to executive officers and principal shareholders. We presume here that such loans are potentially less productive than standard loans. Insider loans may also

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[5] All loans 90 days or more past due and nonaccrual loans are classified as non-performing loans.

[6] Non-performing loans, loan charge-offs and loan loss provisions reflect different aspects of the quality of a bank's loan portfolio. Non-performing loans indicate the current status of loans, charge-offs reflect bad loans made in the past, and loan loss provisions indicate a bank's expectations of future loan losses.

serve as a proxy for the degree to which a bank is operated for the benefit of its management. Data on insider loans are available from the *Quarterly Reports of Condition* beginning in 1983.

B. Changes in performance

We use the dates reported in Table 1 to construct two indicator variables equal to 1 for states permitting branching and interstate banking. We use these indicator variables to estimate the effects of the policy changes in the following pooled time series/cross-section model:

$$Perf_{t,i} = \alpha_t + \beta_i + \gamma_1 Branch_{t,i} + \gamma_2 Bank_{t,i} + \eta_1 PIG_{t,i} + \eta_2 PIG_{t-1,i} + \eta_3 PIG_{t-2,i} + \eta_4 PIG_{t-3,i} + \epsilon_{t,i}$$

where $Perf_{t,i}$ equals one of the six measures of performance; $Branch_{t,i}$ is an indicator equal to 1 for states without restrictions on branching via M&A; $Bank_{t,i}$ is an indicator equal to 1 for states that have entered into an interstate banking agreement; $PIG_{t,i}$ is the growth rate in personal income.

In this specification, β_i measures the state-specific component of banking performance; α_t measures the national business cycle at time *t*; PIG removes the effects of the local (i.e. state-specific) business cycle; γ_1 and γ_2 measure the changes in performance stemming from the two types of deregulation.[7]

The results of the basic models outlined above appear in Table 2. The first two columns present the profitability results. These results show that profits, if anything, *increase* following deregulation. Following branching deregulation, we find that both return on assets and return on equity increase significantly. Following interstate banking, return on equity and return on assets

[7] In constructing the deregulation indicators, we drop the year in which the deregulation went into effect. We also drop Delaware and South Dakota from the analysis entirely. These two states have passed laws providing tax incentives for credit card banks to operate there.

also rise, but the latter increase is not statistically significant. Note that the point estimates are also economically large. For instance, return on assets increases by 16 percent relative to the unconditional mean following branching deregulation.

The last four columns present the changes in bank loan performance. These results appear consistent with the profitability results. In particular, we find large improvements in all four measures of bank lending quality following branch deregulation. We also see smaller improvements following interstate banking, where two of the four loan performance measure improvements are statistically significant at the 10 percent level. The improvements in loan quality, along with the increases in profitability, suggest that banks are, on average, operating more efficiently following deregulation.[8]

C. Did deregulation cause the improvements?

A plausible explanation for the observed improvements in profitability and loan quality following branching deregulation is that states deregulated when their economies were doing poorly. Following deregulation, banks' loan portfolios may improve as the economies recover from the trough of the business cycle. The timing of the policy change may create a spurious association between branching deregulation and measures of profits and loan quality. This possibility is suggested by the fact that 25 of the 35 states that deregulated their branching restrictions during the sample period changed policy after 1984, the first of many years of

[8] Shrinking non-performing loans, charge-offs and loan loss provisions need not reflect superior screening and monitoring of borrowers. Instead, they may reflect changes in the bank loan portfolio; banks may now be making fewer risky loans. We tested for this possibility by looking for changes in banks' loan portfolios after branch deregulation. We find that banks' loan portfolios show no movement away from the two riskiest loan categories, C&I loans and commercial real estate loans, following branch liberalization

dramatically increased bank failure rates.[9] It is possible that, confronted with a severe negative shock to the economy and to the banking system, small banks -- the traditional constituency for branching restrictions -- dropped their opposition to branching in order to find higher purchase prices when exiting the distressed banking industry. Regulators may have pushed for liberalized branching to increase bank consolidation and to wean out weaker banks.[10]

Another explanation for the observed improvements in bank performance following branching is that state legislatures anticipated significant growth in the states' economies and deregulated their banking systems so that banks were better able to fund attractive investment projects.

Neither of these explanations of the improved bank performance is plausible. By including contemporaneous as well as lagged values of personal income growth in our regression, we have controlled explicitly for state-specific business cycles. The estimated effect of branching and interstate banking on bank performance is not biased by any correlation between these deregulations and the business cycle. Moreover, Jayaratne and Strahan (1996) find that states were just as likely to deregulated branching restrictions during the downswing of the business cycle as during the upswing. Finally, Jayaratne and Strahan (1996) also establish that neither bank lending nor manufacturing investment increased following branch deregulation, which is inconsistent with the conjecture that states allowed branching in anticipation of an improved investment climate.

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[9] 1296 banks were subject to FDIC intervention over the nine year interval between 1984 and 1992. In contrast, a mere 25 banks failed over the nine years prior to 1984 [FDIC 1993].

[10] We are grateful to Charles Calomiris and to Stavros Peristiani for suggesting this possibility.

Nevertheless, it is possible that the observed performance changes are the result of some external financial sector innovations not adequately captured by the personal income growth variable that both raised the cost of these geographical restrictions (and therefore raised the likelihood of their removal) and led to improved bank lending. To account for this possibility, we look to the timing of the changes associated with deregulation. If an unmeasured financial sector innovation led to bank deregulation *and* improved banking performance, then we should observe some of the performance improvements to occur shortly before (as well as after) deregulation (assuming that the political process operates slowly enough such that changes in bank performances stemming from the financial innovation occur before deregulation, which seems likely). If, on the other hand, deregulation was the source of the improvements in bank lending, all of the benefits should occur after the deregulation has gone into effect.

We examine the timing of the banking improvements by adding four additional indicator variables to our basic model. The first two indicators are equal to 1 during the first five-year window before branching deregulation and during the first five-year window *after* branching deregulation, and 0 otherwise. The second two indicators are equal to 1 during the first five-year window before interstate banking deregulation and during the first five-year window after interstate banking deregulation, and 0 otherwise. The model with windows is estimated as follows:

$$Perf_{t,i} = \alpha_t+\beta_i+\gamma_1 Branch_{t,i}+\gamma_2 Bank_{t,i}+\gamma_3 Branch_{t,i}^{-5}+\gamma_4 Branch_{t,i}^{+5}+\gamma_5 Bank_{t,i}^{-5}+\gamma_6 Bank_{t,i}^{+5} +\eta_1 PIG_{t,i}+\eta_2 PIG_{t-1,i}+\eta_3 PIG_{t-2,i}+\eta_4 PIG_{t-3,i}+\epsilon_{t,i}$$

where $Branch^{-5}_{t,i}$ ($Bank^{-5}_{t,i}$) equals an indicator equal to 1 during the five years leading up to branching (interstate banking) deregulation; and $Branch^{+5}_{t,i}$ ($Bank^{+5}_{t,i}$) equals an indicator during

the five years immediately after deregulation. In this model, γ_3 equals the change in *Perf* during the five-year window leading up to branching deregulation relative to the years prior to that; $\gamma_1 + \gamma_4$ equals the change in *Perf* during the five year window after branching deregulation; and γ_1 equals the permanent change in *Perf* after deregulation (i.e. in years six and out).

These results are reported in Table 3. Looking first at branching deregulation, we see that all of the beneficial changes in our six performance measures occur *after* deregulation. The coefficient on the indicator for the five-year window prior to branching deregulation is never statistically significant. In other words, all of our measures of performance look the same during the five years before deregulation as they did six years or more before deregulation. By contrast, we find that non-performing loans, charge-offs and loan loss provisions all improve after branching deregulation, with most, but not all of the improvement occurring during the first five-year window after deregulation. The improvements appear to extend beyond five years, since the coefficients on the branching indicator (γ_1) are negative and statistically significant. The non-performing loans to total loans ratio, for instance, falls by 0.8 percentage points during the first five-year window, and falls by an additional 0.4 percentage points subsequently, for a decline of 1.2 percentage points five years after branching deregulation.[11]

For profitability, the coefficients on the two post-deregulation indicators for branching are not individually statistically significant. Nevertheless, the point estimates suggest higher profits

[11] These results are in the spirit of Granger-Causality tests, although such tests usually include lags of the dependent variable on the right-hand side. We have estimated models similar to those in equation (2) with three lags of the dependent variable instead of the personal income growth variables. These results are qualitatively similar to those presented below and are available on request.

after branching deregulation, both during the first five years as well as for years six and out, confirming the results in Table 2.

Looking next at interstate banking, the story becomes somewhat less clear. Here, we find significant improvements in non-performing loans, charge-offs and loan loss provisions both five years before as well as five years after deregulation, while we find that the long-run effect is not statistically significant. This may mean that both the deregulation and the improvements in loan quality were caused by some unmeasured financial sector innovation, or it may mean that bank managers perform better in anticipation of an increased threat of takeover following interstate banking deregulation.

Overall, we remain agnostic on whether or not interstate banking is associated with increased profitability and improved loan quality. The results of Table 2, which do not account for timing, suggest that loan quality measures are somewhat improved on average after states enter an interstate banking agreement, although not always statistically significantly so. The weaker results for interstate banking may be due to the lack of power associated with the estimated coefficients on the interstate banking indicator; most states deregulated interstate banking restrictions around the middle of the 1980s. Even if bank performance improved following interstate banking, the results of Table 3 raise doubts about the direction of causality. Since three performance measures improve before interstate banking is allowed, we cannot reject the possibility that an unmeasured banking innovation improved bank performance and also persuaded state legislatures to allow interstate banking.

IV. How did deregulation improve bank performance?

We have shown that bank performance improves dramatically following intrastate branch deregulation. All of the benefits occur after deregulation, not before, suggesting that the branching policy change helped improve banking. Why did banks perform better after branching was permitted? The efficiency of the banking system may have improved because better-run, more efficient banks are able to gain market share over their less efficient competitors after deregulation (the selection hypothesis) or because managerial effort increases following deregulation (the disciplining hypothesis).[12]

To test these two hypotheses, we rely in this section primarily on banking company-level data. Unlike the statewide aggregate data used in the previous section that capture the combined effects of all changes in the banking system which may have affected bank performance following deregulation, banking company-level data allow us to distinguish between the selection and disciplining hypotheses.

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[12] Another possible explanation for the apparent increase in average bank efficiency following deregulation is that constraints on geographical expansion prevented banks from operating at the optimal scale. We discount this possibility, however, for three reasons. First, there is scant evidence of scale economies in banking, at least for banks with total assets above $500 million (see Berger, Hunter and Timme, 1993). It is implausible that the large improvements that we have found in the state-level aggregates could be explained by inefficiently small banks moving closer to the optimal scale. In 1980, for instance, banks with under $500 million in assets (in 1994 dollars) held less than 30 percent of total assets in the banking system. Second, although the market share of small banks has fallen over the past two decades, thousands of small banks remain in operation. Third, we have estimated the change in our performance measures following branching deregulation for small (banks with assets under $100 million) and large banks separately in the same fixed effects model of Table 2 (not shown). We find that the improvements are *larger* for large banks than for small, a finding inconsistent with the economies of scale explanation. These results are available on request.

Both the selection and disciplining hypotheses imply that the variability of performance across banks should diminish following deregulation. Fewer high cost banks should be able to survive following deregulation, hence lowering cross-bank variability (selection). Moreover, banks with more severe management/shareholder agency problems should improve performance more than banks with less severe agency problems, again lowering variability (disciplining).

Table 4 reports evidence consistent with these implications.[13] For each state, we construct the return on equity, return on assets, and the ratios of charge-offs, non-performing loans, loan loss provisions and insider loans to loans for all banking companies (independent banks and bank holding companies) operating in the state during the year just prior to branching deregulation and 5 years after deregulation.[14] Since we have 32 states deregulating during different years, we first remove the state and year effects (i.e. means) from the variables. We present the standard deviation for the pre- and post-deregulation years in the table. In five of the six cases, the cross-sectional variability declines significantly after deregulation. Together with Table 3, these findings suggest that some banking companies were able to operate inefficiently (relative to other banking companies) prior to deregulation but were less able to do so after.

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[13] For this and subsequent analyses done at the banking company level, we focus on intrastate branching deregulation since the average performance improvements are much larger following this type of deregulation than following interstate banking deregulation.

[14] Some states entered interstate banking agreements during the five-year window. For these states, we use the year just prior to the year in which the state entered the interstate banking agreement as the end of the window. We dropped four states that entered interstate banking agreements in the same year or one year after branching was deregulated (WV, TN, OR and NH).

The evidence in Table 4 does not help determine whether selection or disciplining is the key to the performance improvements. In the next two sub-sections, we provide evidence that both factors played a role.

A. Disciplining

The sharp decline in insider lending following branching deregulation provides prima facie evidence that disciplining is enhanced following branching deregulation (Table 2, column (6)). Of course, some insider lending is probably efficient (i.e. some insider loans have positive net present value), but some of that lending is likely to be an additional form of management compensation. Its decline suggests better disciplining of management. This fact, however, does not tell us how disciplining occurs. One standard solution to management/shareholder agency problems is the threat of takeover. But other means may exist to discipline management. For instance, the threat of entry and declines in market share may prod managers of banks in previously protected markets to exert more effort in minimizing costs and maximizing profits.

To test whether there is any role for disciplining from the takeover market, Table 5 reports estimates of the change in the acquisition rate following deregulation. Here, we measure the acquisition rate as the total dollar value of assets in banking companies acquired in a given year in a given state, divided by total assets in that state at the beginning of the year. We do not include acquisitions that required FDIC assistance. Nor do we include mergers and acquisitions that arise from corporate reorganizations, which involve no change in the control of banking

assets. For example, mergers among banks held by the same bank holding company are not included.[15]

As reported, the acquisition rate increases quite sharply following interstate banking deregulation but not following intrastate branch deregulation. It is not surprising, of course, that banks are acquired at an increased rate after a state joins an interstate banking agreement with other states. What is surprising is that there is no increase following branch deregulation. This finding casts some doubt on the hypothesis that disciplining is enhanced after branching deregulation through a more active takeover market.[16]

Taking the results of Tables 4 and 5 together, we find a decline in performance variability but no increase in the rate of acquisitions following branching deregulation. In the absence of increased takeover activity, the decline in performance variability seems more consistent with disciplining than with selection. It suggests that some banks suffer more from lax management and that better disciplining improves the performance most for banks which suffer most from these agency problems. Since we see little change in the acquisition rate, these results suggest that better disciplining occurs primarily through enhanced competition in the goods market. That is, faced with the prospect of losing market share to new competitors once branching restrictions are lifted, lax managers may have improved their performance.

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[15] These data are taken from Rhoades (1986) and Rhoades (1996). We thank Stephen Rhoades for providing us the data.

[16] Column (2) of Table 5 shows that the HHI increases sharply following branching deregulation, suggesting that there are important changes in the size distribution of banks, notwithstanding the acquisition result. This suggests that some banks grow following branching deregulation, either through internally generated growth (e.g. de novo branching) or through branch purchases.

Whether disciplining via the takeover market plays an important role after interstate banking remains unresolved. On the one hand, we see a sharp increase in takeovers following interstate banking and some small improvements in lending. Also, Hubbard and Palia (1995) find increases in CEO turnover and increases in the performance sensitivity of CEO pay after states enter interstate banking agreements. On the other hand, the improvements we do see following interstate banking seem to occur during the five years *before* deregulation. This is only consistent with the disciplining hypothesis if deregulation were anticipated and thereby spurred increased managerial effort during the five year pre-deregulation window.

On balance, the evidence here provides weak support for the disciplining hypothesis -- the idea that, by limiting competition in the goods market and possibly by limiting the takeover market, geographic restrictions weakened management discipline and raised banks' costs. [17]

B. Selection

According to the selection hypothesis, average bank performance improves following branching deregulation because the poorly-run, inefficient banking companies lose ground to the better-run, more efficient banking companies. We conduct two exercises to test this notion. First, we compare banks that grow following branching deregulation with banks that shrink. If the selection hypothesis is correct, banks that grow following deregulation should be a better class of banks than those that shrink. In this exercise, we separate banks into "growers" and "shrinkers" based on their growth rates after deregulation; we then compare their pre-

[17] Prowse (1995) casts some doubt on the importance of bank takeover activity in disciplining bank managers. He finds that hostile takeovers almost never occur in banking, in sharp contrast to their frequency in nonfinancial industries. It seems reasonable that the threat of takeover can only discipline management effectively if some hostile takeovers actually take place.

deregulation performance. The second exercise is the reverse of the first. Bank are first separated by their pre-deregulation performance into high and low performers. The selection hypothesis predicts that the better performers should grow faster following deregulation.

The results of the first exercise are in Table 6. Here, we classify as "growers" all banking companies that grew faster than the median banking company during the six-year period beginning the year before deregulation and ending five years after branching deregulation. "Shrinkers" are those banking companies that either grew slower than the median bank or which exited altogether (through mergers or failures).

We find that for all of our performance measures, banking companies that grow have better ex-ante performance than banking companies that shrink.[18] For example, during the post-deregulation period (columns 4-6), growers' mean return on equity was 1.2 percentage points below the median, while shrinkers' mean return on equity was 6.3 percentage points below the median.[19] The median value for growers' return on equity was 0.81 percentage points above the unconditional median and 0.80 percent points below the unconditional median for shrinkers. Return on equity exceeded the median 57 percent of the time for growers but only 44 percent of the time for shrinkers.[20]

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[18] We do not include either insider lending or non-performing loans in this analysis, however, since these items are only available beginning in 1982 and 1983.

[19] The mean return on equity is below the median for both growers and shrinkers because the unconditional mean return on equity is 3.7 percentage points below the unconditional median.

[20] For each performance measure, we subtract the median of that measure which prevailed in that bank's state and that year, thereby eliminating the effects of the business cycle (which is required because we are pooling different states in different years).

This positive correlation between bank performance and asset growth, however, may not be due solely to a selection process. Banks facing better loan demand and investment opportunities are likely to show superior performance and faster asset growth. We account for this possibility by using the grower-shrinker comparison in the pre-deregulation period (Table 6, columns 1-3) as a "control."[21] We observe the same pattern: growers are more profitable and have better loan quality, on average, than shrinkers in the pre-deregulation period. Nevertheless, the contrast between growers and shrinkers is sharper in the post-deregulation period (Table 6, columns 7 and 8). This suggests that the positive correlation between growth and bank performance after branching deregulation is not entirely due to cross-sectional differences in demand conditions (assuming that such demand conditions generate the same degree of correlation between asset growth and bank performance before and after branching is allowed).

The exercise in Table 6 is limited by the fact that even if the *average* bank that grew after branching deregulation was a high-profit bank, a few, poorly-performing banks may have grown the most, and the results in Table 6 will not reveal that fact. This possibility, which undermines the selection hypothesis, is tested in Table 7 by reversing the exercise in Table 6. In Table 7, we ask whether ex-ante performance has more power to predict growth in subsequent years once branching is permitted. We separate bank into high performers and low performers based on return on assets, return on equity, net charge-offs and loan loss provisions. High performers are those banks that are above the median in profitability and below the median in net charge-offs

[21] In the pre-deregulation period, growers are banking companies that grew faster than the median banking company during the period beginning seven years before deregulation and ending the year before deregulation. We use the same window width in the pre-deregulation period as in the post-deregulation period for those states where the post-deregulation window was less than six years (see note 14).

and loan loss provisions.[22] We then regress banking company asset growth on each ex-ante performance indicator along with bank size and the capital-to-asset ratio at the beginning of the period.[23] (Bank size is included because large banks may be expected to grow relatively slowly, and capital is included because regulatory capital adequacy standards may constrain growth.)

As in Table 6, we report these regressions in both the pre- and post-deregulation periods. We find that in three of the four cases, the impact of performance on subsequent growth increases after deregulations (Table 7). For instance, before deregulation, banking companies with above-median return on equity grow 0.9 percentage points faster than banking companies with below-median return on equity. By contrast, once branching is allowed, this growth differential triples (to 3.3 percentage points) and become statistically significant. This pattern is also evident for net charge-offs and for loan loss provisions, but not for return on assets.

To test the statistical significance of the observed increase in the performance-growth association after deregulation, we pool the data from the pre- and post-deregulation periods. We then re-estimate the model with an added indicator variable for deregulation along with its interaction with each performance measure (Table 7, column 3). The model was estimated on the first differences of the growth, size, capital and performance indicator variables. This is equivalent to a fixed effects estimator, which is preferred here because the presence of the same

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[22] The median performance measures are conditional on year and state. For example, a bank in Alabama would be classified as an above-median ROE bank in 1980 if its ROE is above the median ROE in Alabama in 1980. This approach removes the effects of inflation and state-specific factors on profitability.

[23] The relationships between the continuous measures of performance and growth were non-linear in both the pre- and post-deregulation periods. We therefore use an indicator variable of performance rather than the continuous variable so that comparisons of the coefficients across time are more easily interpreted.

banks in both periods is likely to induce a correlation between the error term in the two cross-sectional regressions. Table 7, column 3 shows that all four performance measures are statistically significantly better predictors of growth after branching than before branching.[24]

The comparisons of average growth rates of high and low performance banks in Table 7 exclude banks that exit the industry due to failures or mergers. Such exits are excluded because their "growth rate" cannot be observed. Exiting banks, however, may carry significant information about any selection mechanism. To account for this, we estimate the probability that banking companies with above-median performance before deregulation exit the industry after deregulation. We compare this exit probability with that for banking companies that perform below the state median before branching was allowed. We find that each of the four performance measures predicts that better-performing banks have a lower probability of exiting than under-performing banks. Although we find a similar pattern for the period immediately before branching deregulation, the difference in exit probabilities between high and low performance banks increases once branching is permitted, further supporting the selection hypothesis.

For example, in the pre-deregulation period, a banking company with above-average return on equity had a 22 percent chance of exiting, while a banking company with below-average return on equity had a 26 percent chance of exiting -- the small difference in probabilities reflects a relatively weak selection mechanism. By contrast, after branching deregulation, a

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[24] The pooled regression does not entirely replicate the cross sectional regressions, perhaps because they do not use quite the same data. The pooled regression is estimated using only those banking companies that survived the entire sample period. In contrast, the pre-deregulation cross-sectional regression is estimated on all banks that are alive over the pre-deregulation period, and this includes banks that exited once branching was allowed.

banking company with above-average return on equity had a 28 percent chance of exiting while a banking company with below-average return on equity had a 37 percent chance of exiting.[25]

The results in Tables 6 and 7, along with the results on exit probabilities, suggest that selection effects became more powerful following branching deregulation. To what extent can this selection process explain the improvements in aggregate, state-level banking performance observed in Table 2? For example, Tables 2 and 3 suggest that the asset-weighted average of banking company return on equity increased by 9 percentage points after statewide branching was permitted, with 5 of the 9 percentage point increase occurring during the first five years after deregulation. What fraction of this improvement can be explained by the selection process?

We answer this question by answering the following question: what would be the asset-weighted average return on equity in the year before deregulation if the asset weights are based on the distribution of assets observed five years after deregulation? If, as the selection hypothesis predicts, the initially high-profit banks expand the most following deregulation, then the asset-weighted average return on equity based on bank sizes observed five years after deregulation should be greater than the asset-weighted return on equity based on bank sizes observed the year before deregulation.[26]

This prediction of the selection conjecture is confirmed. The weighted average return on equity before deregulation was 8.3 percent. Based on the asset distribution observed five years later, the average increases to 9.3 percent. By contrast, in the pre-deregulation period we find

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[25] These results are not shown in a table but are available on request.

[26] By using the same performance data for both averages, we hold constant other factors (such as disciplining) that may have improved performance following deregulation.

that the actual weighted average return on equity is *lower* than the weighted average based on assets observed five years later, falling from 14.8 percent to 11 .7 percent. Using a difference-in-differences approach, these estimates suggest that selection effects could account for an increase in return on equity of about 4 percentage points ([9.3-8.3]-[11.7-14.8]). This is below the estimated increase in Table 2 (although it is within two standard errors of that estimate) but it accounts for 80 percent of the increase in the return on equity observed within the first five years after branching (Table 3, column 2). The same simulation exercise yields an improvement of 50 percent or more of the estimated effects of the other three performance measures (loan loss provisions, return on assets and charge-offs) estimated in Table 2.[27]

To summarize, banks that have higher profits and better loan portfolios before branching deregulation are observed to grow at the expense of other banks once branching is permitted. Moreover, banks with initially poor performance exit the industry more frequently. Although similar patterns are evident in the period before deregulation, the performance-growth relation is stronger after branching deregulation, consistent with the selection hypothesis. The simulation exercise suggests that selection effects account for most of the estimated improvements in bank performance.

V. Conclusions

The literature on the effects of entry regulation on efficiency has shown that such interventions can reduce static efficiency by preventing firms from allocating their assets

[27] These results are based on data pooled across all states. We have also done these simulations for each state separately and found similar results. For instance, in 20 out of 31 cases, we find that re-weighting the average return on equity based on the size distribution five years after deregulation leads to an increase in this average, as predicted by the selection hypothesis.

optimally. For example, trucking regulations prevented carriers from hauling regulated commodities on return trips, making empty backhauls a serious problem. Airline regulations increased costs by reducing load factors and by forcing airlines into serving inefficient routes to small communities. However, relatively little has been done on the effects of entry regulation on dynamic efficiency.

In this paper, we find evidence that long-standing branching restrictions in banking served as entry barriers that prevented more efficient banks from expanding at the expense of their less efficient rivals. By retarding the "natural" evolution of the industry, such restrictions reduced the performance of the average banking asset.

The literature on price and entry regulations suggests that these regulations can also enhance market power, and previous work in banking has found that restrictions on the ability of banks to branch statewide or expand across state lines had similar effects. However, welfare losses associated with such regulation-induced market power in banking are probably small (Rhoades 1982). We do not estimate the welfare gains associated with the observed improvements in loan portfolios following branching deregulation. Nevertheless, the large improvements in loan portfolios (30 percent or more) after statewide branching suggest that entry restrictions exacted significant welfare losses.

The improvements in efficiency of the banking system suggests that benefits may have flowed to both bank owners and bank customers -- depositors and borrowers. As noted, previous work both in banking and in other industries suggests that restrictions on entry and expansion may enhance market power. To the extent that market power was reduced following deregulation, depositors and borrowers may therefore have been made better off both because

costs fell and because prices moved closer to costs. On the other hand, if market power was not diminished, the benefits of the reduced costs could have been shared between owners (in the form of higher profits), depositors and borrowers. Our finding that profits increased following deregulation may be more consistent with this latter view, although the long-run effects of deregulation on profitability are not clear from our findings since most of the states deregulated after 1984. An analysis of the effects of deregulation on market power in banking would require looking carefully at changes in deposit and loan interest rates. We leave this question for future research.

References

Amel, Dean, "State Laws Affecting the Geographic Expansion of Commercial Banks," manuscript, Board of Governors of the Federal Reserve System, 1993.

Amel, Dean and Nellie Liang, "The Relationship between Entry into Banking Markets and Changes in Legal Restrictions on Entry," *The Antitrust Bulletin*, XXXVII(1992), 631-649.

Berger, Allen N., William C. Hunter and Stephen G. Timme, "The Efficiency of Financial Institutions: A Review and Preview of Research Past, Present and Future," *Journal of Banking and Finance* 17(1993) 221-249.

Berger, Allen N., Anil K Kashyap and Joseph M. Scalise, "The Transformation of the U.S. Banking Industry: What a Long Strange Trip It's Been," *Brookings Paper on Economic Activity*, II(1995), 55-218.

Berger, Allen and Timothy Hannan, "The Price-Concentration Relationship in Banking," *Review of Economics and Statistics*, CXXI (1989), 291-299.

Calem, Paul, "The Impact of Geographic Deregulation on Small Banks," *Business Review*, Federal Reserve Bank of Philadelphia (December 1994).

Calomiris, Charles, "Regulation, Industrial Structure, and Instability in U.S. Banking: An Historical Perspective," in Michael Klausner and Lawrence White (eds.) *Structural Change in Banking*, New York University: New York 1993, 19-116.

Demsetz, Rebecca S. and Philip E. Strahan, "Size, Diversification and Risk at U.S. Bank Holding Companies," *Journal of Money, Credit and Banking*, forthcoming.

Economides, Nicholas, R. Glenn Hubbard and Darius Palia, "The Political Economy of Branching Restrictions and Deposit Insurance: A Model of Monopolistic Competition among Small and Large Banks," NBER working paper No. 5210(1995).

Evanoff, Douglas and Diana Fortier, "Reevaluation of the Structure-Conduct-Performance Paradigm in Banking," *Journal of Financial Research*, I (June 1988), 277-294.

Flannery, Mark, "The Social Costs of Unit Banking Restrictions," *Journal of Monetary Economics*, 13(1984), 237-249.

Federal Deposit Insurance Corporation, *Historical Statistics on Banking*, (Washington, D.C., 1993).

Hsiao, Cheng, *Analysis of Panel Data*, (Cambridge: Cambridge University Press, 1986).

Hubbard, Glenn and Darius Palia, "Executive Pay and Performance: Evidence from the U.S. Banking Industry," *Journal of Financial Economics*, XXXIX(1995), 105-130.

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

McLaughlin, Susan, "The Impact of Interstate Banking and Branching Reform: Evidence from the States," *Current Issues in Economics and Finance*, I(1995), Federal Reserve Bank of New York.

Moore, Robert M. "Does Geographic Liberalization Really Hurt Small Banks?" *Financial Industry Studies*, Federal Reserve Bank of Dallas, December 1995.

Prowse, Stephen, "Alternative Methods of Corporate Control in Commercial Banks," mimeo, May 26, 1996.

Rhoades, Stephen, "Welfare Loss, Redistribution Effects and Restriction of Output Due to Monopoly in Banking," *Journal of Monetary Economics* 9(1982), 375-387.

Rhoades, Stephen, "The Operating Performance of Acquired Firms in Banking before and after Acquisitions," Federal Reserve Board of Governors Staff Study No. 149, 1986.

Rhoades, Stephen, "Bank Mergers and Industrywide Structure, 1980-94," Federal Reserve Board of Governors Staff Study No. 169, 1996.

Schranz, Mary, "Takeovers Improve Firm Performance: Evidence from the Banking Industry," *Journal of Political Economy*, CI(1993), 299-326.

White, Halbert, "A Heteroskedasticity-consistent covariance Matrix Estimator and A Direct Test for Heteroskedasticity," *Econometrica*, XLVIII(1980), 817-830.

Winston, Clifford, "Economic Deregulation: Days of Reckoning for Microeconomists," *Journal of Economic Literature*, XXXI(1993), 1263-1289.

Table 1
Deregulation of Restrictions on Geographical Expansion, by State

	Intrastate Branching Allowed by Merger or Acquisition (1)	State Entered an Interstate Banking Agreement (2)
AK	Deregulated Before 1970	1982
AL	1981	1987
AR	Not Deregulated by 1992	1989
AZ	Deregulated Before 1970	1986
CA	Deregulated Before 1970	1987
CO	1991	1988
CT	1980	1983
DC	Deregulated Before 1970	1985
FL	1988	1985
GA	1983	1985
HI	1986	Not Deregulated by 1992
IA	Not Deregulated by 1992	1991
ID	Deregulated Before 1970	1985
IL	1988	1986
IN	1989	1986
KS	1987	1992
KY	1990	1984
LA	1988	1987
MA	1984	1983
MD	Deregulated Before 1970	1985
ME	1975	1978
MI	1987	1986
MN	Not Deregulated by 1992	1986
MO	1990	1986
MS	1986	1988
MT	1990	1993
NC	Deregulated Before 1970	1985
ND	1987	1991
NE	1985	1990
NH	1987	1987
NJ	1977	1986
NM	1991	1989
NV	Deregulated Before 1970	1985
NY	1976	1982
OH	1979	1985
OK	1988	1987
OR	1985	1986
PA	1982	1986
RI	Deregulated Before 1970	1984
SC	Deregulated Before 1970	1986
TN	1985	1985
TX	1988	1987
UT	1981	1984
VA	1978	1985
VT	1970	1988
WA	1985	1987
WI	1990	1987
WV	1987	1988
WY	1988	1987

Source: Amel (1993).

Notes: Delaware and South Dakota are dropped from the analysis since these two states have been dominated by credit card banks since the early 1980s.

Table 2

Changes in Bank Lending Quality Following Intrastate Branch and Interstate Bank Reform

	Net Income/ Total Assets *(ROA)* (1)	Net Income/ Equity *(ROE)* (2)	*Non-Performing Loans/ Total Loans* (3)	*Net Loan Charge-offs/ Total Loans* (4)	*Loan Loss Provisions/ Total Loans* (5)	*Insider Loans/ Total Loans* (6)
Intrastate Branching Indicator	0.0012	0.0943	-0.0081	-0.0045	-0.0048	-0.0014
	(2.10)*	(2.48)*	(3.68)*	(5.82)*	(5.35)*	(3.15)*
Interstate Banking Indicator	0.0007	0.0789	-0.0035	-0.0013	-0.0011	-0.0003
	(1.13)	(2.11)*	(1.74)	(1.84)	(1.16)	(0.67)
State Personal Income Growth	0.0425	1.0420	-0.2386	-0.0528	-0.0668	-0.0209
	(4.40)*	(2.85)*	(5.21)*	(5.31)*	(4.98)*	(2.74)*
Personal Income Growth (Lagged 1 Period)	0.0419	1.0805	-0.2194	-0.0541	-0.0509	-0.0089
	(3.87)*	(3.23)*	(5.73)*	(3.67)*	(3.74)*	(1.15)
Personal Income Growth (Lagged 2 Periods)	0.0250	0.5927	-0.1400	-0.0446	-0.0301	-0.0091
	(3.67)*	(1.68)	(3.48)*	(3.37)*	(3.32)*	(1.04)
Personal Income Growth (Lagged 3 Periods)	0.0147	-0.2391	-0.0385	-0.0236	-0.0171	0.0144
	(1.47)	(0.57)	(0.94)	(2.36)*	(1.23)	(2.37)*
Adjusted R-Squared	30.2%	11.8%	51.3%	44.1%	43.3%	69.5%
Sample Period	1975-1992	1975-1992	1982-1992	1976-1992	1975-1992	1983-1992
N	802	802	468	754	802	422
Dependent Variable Mean	0.77%	14.60%	2.67%	0.72%	0.86%	0.45%

Sources: Reports of Income and Condition. Dates for deregulation are from Amel (1993); see Table 1.

Notes: Each column presents a pooled time series/cross-section regression with state level data for the sample period indicated. Each regression contains state and time fixed effects. Absolute value of t-statistic, based on White standard error, reported below each coefficient in parentheses; "*" means significance at the 5% level . Delaware and South Dakota are dropped from each regression.

Table 3

Changes in Bank Lending Quality Following Intrastate Branch and Interstate Bank Reform, with Windows

	Net Income/ Total Assets *(ROA)* (1)	Net Income/ Equity *(ROE)* (2)	*Non-Performing Loans/ Total Loans* (3)	*Net Loan Charge-offs/ Total Loans* (4)	*Loan Loss Provisions/ Total Loans* (5)	*Insider Loans/ Total Loans* (6)
Intrastate Branching Indicator	0.0011	0.1049	-0.0123	-0.0058	-0.0054	-0.0009
	(0.99)	(1.35)	(3.01)*	(4.01)*	(3.31)*	(1.08)
Interstate Banking Indicator	-0.0005	-0.1722	-0.0002	0.0016	0.0003	0.0006
	(0.27)	(1.43)	(0.04)	(0.75)	(0.11)	(0.50)
5 Years Before Branching (0,1)	0.0001	-0.0288	-0.0021	-0.0002	-0.0005	0.0004
	(0.18)	(1.45)	(1.17)	(0.46)	(0.76)	(0.88)
5 Years After Branching (0,1)	-0.0003	-0.0545	0.0041	0.0022	0.0012	-0.0003
	(0.37)	(1.14)	(1.87)	(2.56)*	(1.25)	(0.59)
5 Years Before Banking (0,1)	0.0010	-0.0410	-0.0065	-0.0026	-0.0029	0.0013
	(1.78)	(1.67)	(2.95)*	(3.87)*	(3.68)*	(2.06)*
5 Years After Banking (0,1)	0.0021	0.1761	-0.0092	-0.0053	-0.0043	0.0005
	(1.44)	(1.90)	(2.60)*	(2.99)*	(2.34)*	(0.90)
State Personal Income Growth	0.0430	0.9491	-0.2293	-0.0550	-0.0690	-0.0222
	(4.23)*	(2.58)*	(5.08)*	(5.64)*	(4.97)*	(2.89)*
Personal Income Growth (Lagged 1 Period)	0.0427	0.9467	-0.2205	-0.0562	-0.0539	-0.0095
	(3.78)*	(2.72)*	(5.97)*	(3.89)*	(3.86)*	(1.27)
Personal Income Growth (Lagged 2 Periods)	0.0256	0.5549	-0.1403	-0.0461	-0.0315	-0.0082
	(3.79)*	(1.59)	(3.68)*	(3.49)*	(3.54)*	(0.94)
Personal Income Growth (Lagged 3 Periods)	0.0150	-0.2635	-0.0352	-0.0238	-0.0177	0.0140
	(1.50)	(0.63)	(0.87)	(2.46)*	(1.30)	(2.28)*
Adjusted R-Squared	30.9%	13.0%	53.5%	47.8%	45.3%	69.6%
Sample Period	1975-1992	1975-1992	1982-1992	1976-1992	1975-1992	1983-1992
N	802	802	468	754	802	422
Dependent Variable Mean	0.77%	14.60%	2.67%	0.72%	0.86%	0.45%

Sources: Reports of Income and Condition. Dates for deregulation are from Amel (1993); see Table 1.

Notes: Each column presents a pooled time series/cross-section regression with state level data for the sample period indicated. Each regression contains state and time fixed effects. Absolute value of t-statistic, based on White standard error, reported below each coefficient in parentheses; "*" means significance at the 5% level . Delaware and South Dakota are dropped from each regression.

Table 4

Cross Sectional Variability in Bank Performance Measure Before and After Branching Deregulation

	Cross Sectional Standard Deviation		
	Pre Deregulation (1)	Post Deregulation (2)	F Statistic (3) [H0: (1)=(2)]
Net income/assets	0.0160	0.0105	2.34 *
Net income/capital	0.1820	0.1122	2.63 *
Net charge-offs/loans	0.0198	0.0118	2.81 *
Loan loss provisions/loans	0.0214	0.0129	2.76 *
Non-Performing loans/loans	0.0360	0.0207	3.04 *
Insider loans/loans	0.0273	0.0289	0.90

Sources: Reports of Income and Condition. Dates for deregulation are from Amel (1993); see Table 1.

Notes: Includes all states that deregulated their branching restrictions between 1970 and 1992. Banking companies with capital-asset ratios under 3 percent are dropped from the analysis of return on capital. State and time specific means are removed from the data. * means significance at the 5% level .

Table 5
Changes in Banking Market Structure Following Deregulation

	Acquisition Rate (1)	Log of State HHI (2)
Intrastate Branching Indicator	-0.0064	0.3072
	(0.47)	(6.49) *
Interstate Banking Indicator	0.0459	0.0107
	(2.48) *	(0.14)
5 Years Before Branching (0,1)	0.0172	0.0344
	(1.67)	(1.40)
5 Years After Branching (0,1)	0.0062	-0.1168
	(1.21)	(3.62) *
5 Years Before Banking (0,1)	-0.0252	0.0629
	(1.87)	(2.47) *
5 Years After Banking (0,1)	0.0001	0.0012
	(0.02)	(0.03)
State Personal Income Growth	0.0959	
	(2.00) *	
Personal Income Growth (Lagged 1 Period)	-0.0058	
	(0.10)	
Personal Income Growth (Lagged 2 Periods)	-0.0095	
	(0.24)	
Personal Income Growth (Lagged 3 Periods)	0.0779	
	(1.66)	
Adjusted R-Squared	15.2%	94.8%
Sample Period	1975-1992	1975-1992
N	802	802
Dependent Variable Mean	2.2%	7.46

Sources: HHI is based on data from the Summary of Deposits; acquisition rates are based on data in Rhoades (1995). Dates for deregulation are from Amel (1993); see Table 1.

Notes: HHI equals the sum of the squared deposit shares held by all banking companies in the state. Banks under common ownership are consolidated. The acquisition rate equals the total dollar value of assets in acquired banks divided by total assets in all banks, by state and year. Each column presents a pooled time series/cross-section regression with state level data for the sample period indicated. Each regression contains state and time fixed effects. Absolute value of t-statistic, based on White standard error, reported below each coefficient in parentheses; "*" means significance at the 5% level . Delaware and South Dakota are dropped from each regression.

Table 6
Ex-Ante Performance Measures for Growing and Shrinking Banks

	Pre-Deregulation Period			Post-Deregulation Period			Difference in Differences	T-stat
	Shrinkers (1)	Growers (2)	Difference (3) (2)-(1)	Shrinkers (4)	Growers (5)	Difference (6) (5)-(4)	(7) (6)-(3)	(8)
Net income/assets								
Mean	-0.19%	0.01%	0.20%	-0.60%	-0.06%	0.54%	0.34%	8.50
Standard Error	0.02%	0.01%		0.03%	0.02%			
Median	-0.05%	0.05%	0.10%	-0.09%	0.08%	0.18%	0.08%	
Percent above median	45.38%	54.43%	9.05%	42.43%	57.34%	14.91%	5.86%	
Net income/capital								
Mean	-2.41%	-0.71%	1.70%	-6.28%	-1.23%	5.05%	3.35%	7.07
Standard Error	0.23%	0.15%		0.33%	0.20%			
Median	-0.25%	0.30%	0.55%	-0.80%	0.81%	1.62%	1.07%	
Percent above median	47.17%	52.83%	5.66%	43.54%	57.02%	13.48%	7.82%	
Net charge-offs/loans								
Mean	0.39%	0.18%	-0.21%	0.74%	0.21%	-0.54%	-0.32%	-6.20
Standard Error	0.02%	0.02%		0.04%	0.02%			
Median	0.03%	-0.02%	-0.05%	0.07%	-0.06%	-0.13%	-0.07%	
Percent above median	53.51%	46.32%	-7.19%	55.30%	44.45%	-10.85%	-3.66%	
Loan loss provisions/loans								
Mean	0.37%	0.17%	-0.20%	0.81%	0.23%	-0.58%	-0.38%	-7.15
Standard Error	0.02%	0.02%		0.04%	0.02%			
Median	0.02%	-0.02%	-0.04%	0.06%	-0.04%	-0.10%	-0.06%	
Percent above median	52.59%	47.23%	-5.36%	54.26%	45.49%	-8.78%	-3.41%	

Notes: Growers are banking companies with a growth rate in total assets above the median in that state and year; shrinkers are banking companies with a growth rate in total assets below the median in that state and year (the growth of assets at banks which exit the industry is coded as -100 percent). All of the variables are measured relative to the median value of that variable in the applicable state and year.

Table 7

Regressions of Banking Company Growth on Ex-Ante Performance Indicators

	Pre-Deregulation (1)	Post-Deregulation (2)	Pooled with Bank Fixed Effects (3)
Specification based on Return on Assets			
Above Median Return on Assets Indicator	-0.0262 *	-0.0056	0.0148
	(0.0081)	(0.0108)	(0.0099)
Above Median Return on Assets Indicator	-	-	0.0606 *
* Post Deregulation Indicator	-	-	(0.0146)
Capital-Asset Ratio	2.7751 *	2.1414 *	0.2212
	(0.1725)	(0.2067)	(0.2404)
Log of Total Assets	0.0069	-0.0012	-0.8491 *
	(0.0040)	(0.0060)	(0.0241)
N	6,968	5,888	4,521
R-Squared	22.13%	17.13%	44.80%
Specification based on Return on Equity			
Above Median Return on Equity Indicator	0.0087	0.0326 *	0.0177
	(0.0078)	(0.0103)	(0.0102)
Above Median Return on Equity Indicator	-	-	0.0650 *
* Post Deregulation Indicator	-	-	(0.0148)
Capital-Asset Ratio	2.7338 *	2.1381 *	0.3028
	(0.1715)	(0.2017)	(0.2384)
Log of Total Assets	0.0071	-0.0040	-0.8556 *
	(0.0041)	(0.0060)	(0.0242)
N	6,968	5,888	4,521
R-Squared	22.02%	17.27%	44.98%
Specification based on Net Charge-Offs/Loans			
Above Median Charge-offs Indicator	-0.0428 *	-0.0758 *	-0.0012
	(0.0086)	(0.0097)	(0.0106)
Above Median Charge-offs Indicator	-	-	-0.0773 *
* Post Deregulation Indicator	-	-	(0.0141)
Capital-Asset Ratio	2.4162 *	1.6788 *	0.0803
	(0.1879)	(0.2205)	(0.2677)
Log of Total Assets	0.0104 *	-0.0089	-0.8963 *
	(0.0047)	(0.0062)	(0.0247)
N	5,990	5,755	3,992
R-Squared	18.14%	16.17%	47.32%
Specification based on Loan Loss Provisions/Loans			
Above Median Loan Loss Provisions Indicator	-0.0055	-0.0359 *	0.0042
	(0.0078)	(0.0098)	(0.0098)
Above Median Loan Loss Provisions Indicator	-	-	-0.0584 *
* Post Deregulation Indicator	-	-	(0.0140)
Capital-Asset Ratio	2.6940 *	1.8838 *	0.1721
	(0.1724)	(0.2221)	(0.2569)
Log of Total Assets	0.00702	-0.00442	-0.8397 *
	(0.0040)	(0.0058)	(0.0240)
N	6,977	5,925	4,554
R-Squared	21.96%	15.78%	44.28%

Notes: Columns (1) and (2) present regressions for the pre and post branching deregulation periods, respectively; each regression includes a constant (not shown). Column (3) presents the results of the pooled model estimated with fixed effects; this model also includes a constant and post-deregulation indicator (not shown). The number of observations in this model represents the number of banking companies that appear in both samples, and the R-Squared represents the fit of the "within" estimator. Each set of rows represents the results using one proxy for bank quality. The performance indicators are measured as of the beginning of the period; the indicator equals 1 for banking companies with above-median values for that variable in the appropriate state and year. Since states deregulated at different times, each cross-sectional regression includes a set of state indicator variables (not shown). Also, we drop banking companies with capital-asset ratios below 3 percent from the two profit regressions. White standard errors are reported below each coefficient in parentheses. Coefficients denoted with a "*" are statistically significant at the 5 percent level .

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