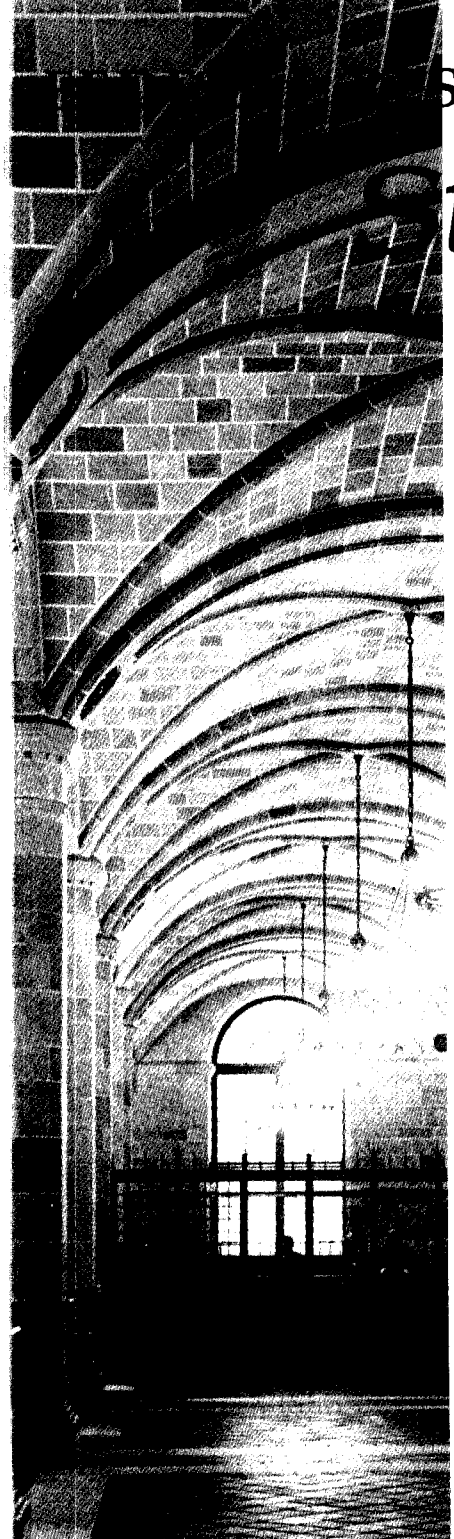

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Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking

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Abstract

This paper shows that bank performance improves significantly after restrictions on bank expansion are lifted. We find that operating costs and loan losses decrease sharply 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 grow 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 that most of the reduction in banks' costs were passed along to bank borrowers in the form of lower loan rates.

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. The literature on the effects of price and entry regulation on efficiency has shown that such interventions can reduce static efficiency by preventing firms from allocating their assets 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 preventing airlines from routing optimally (Morrison and Winston 1986). Lifting these regulation-induced production distortions led to one-time improvements in efficiency. Data limitations, however, have limited work on the effects of entry and price regulation on the evolution of industry costs over time (Winston 1993).[1]

In this paper, we find that the severe restrictions imposed on the geographic scope of banks retarded the natural process of selection whereby better-managed, lower cost firms expand at the expense of inefficient firms. Consequently, these restrictions raised the costs associated with the average bank asset. The banking industry is a unique source of evidence on the dynamic effects of entry regulation. 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

[1] Among the few exceptions are Caves, et al. (1981), who find that productivity in the deregulated Canadian railroad industry grew much faster than in the regulated U.S. railway industry, and Joskow (1981), who finds that rate and certificate-of-need regulation of hospitals slowed the diffusion of CT scans.

to cross *county* lines in many states. These restrictions have probably been binding since the 1890s, when banks began forming chain banks (banks commonly owned by a group of individuals) as a means of getting around branching restrictions (Calomiris 1993)[2]. These long-standing restrictions have contributed to the extremely fragmented structure of the U.S. banking industry, with thousands of banks and bank holding companies, a structure that 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. Changes in banking once these restrictions are lifted allow us to understand the effects of such restrictions. Moreover, because most branching restrictions were imposed by state regulations and because states deregulated at different times, we are able to use states that 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 1997) and increased market power (Rhoades 1982, Flannery 1984, Evanoff and Fortier 1988, Amel and Liang 1992).

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[2] The public debate in favor of geographic restrictions on banks was traditionally dominated by political arguments about the dangers of excessive concentration of financial power (Chapman and Westerfield 1942). But small, inefficient banks probably benefited from the rents generated by these regulations. Economides et al. (1996) find that the 1927 McFadden Act, which imposed several restrictions on branching, was supported in Congress by representatives from states with small, poorly capitalized banks.

Less is known 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 increases in both CEO turnover and the sensitivity of CEO compensation to performance after states 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. They offer no evidence, however, that banks improved their performance following interstate banking.

In this paper, we find that banks' efficiency improves sharply once restrictions on intrastate branching are lifted and, to a lesser extent, after interstate banking is permitted. Loan losses decrease by about 50 percent once statewide branching is permitted. Operating costs decrease by about 8 percent after deregulation of branching restrictions.

We show that the observed efficiency 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, banks' costs decrease significantly *after* branching deregulation but not before, suggesting that causality flows from

deregulation to improved performance rather than the reverse. (However, loan losses decline before, as well as after, states allow interstate banking.)

Most of the reduced costs in banking after branch deregulation appear to have been passed along to bank customers in the form of lower loan rates. Average loan rates fall by about 19 basis points in the short run and by 30 basis points in the long run (which amounts to about two-thirds of the reduction in loan losses). As a result, we find only small, generally statistically insignificant increases in bank profitability after deregulation. A back-of-the-envelope calculation suggests that borrowers saved approximately $6 billion in 1992 as a result of lower loan rates.

Much of the efficiency improvements appear to have occurred because branching deregulation triggered a process of selection, whereby better-performing banks expanded at the expense of high-cost, low-profit banks. Although better-performing banks grow faster than underachievers 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 the efficiency of the average bank asset.

Although we make no direct estimates of the welfare gains from geographic deregulation in banking, the evidence here allows educated guesswork about winners and losers. Bank borrowers benefited from lower rates once limits on the geographic scope of banks were lifted. *Average* bank profits did not decrease after deregulation (in fact, there is weak evidence of a small increase in the average return on equity), but inefficient banks that were protected by

stringent entry barriers probably lost profits and market share while efficient institutions gained. But the welfare gains from the deregulation studied here probably extend beyond the banking industry. By allowing inefficient banks to survive, geographic restrictions probably lowered the quality of bank intermediation in the economy. The sharp drop in loan losses once statewide branching was permitted suggests that banks screened and monitored borrowers better after deregulation. The extensive literature on the importance of bank intermediation in reducing financial market frictions and in improving the efficiency of capital markets implies that the real economy may have benefited from bank deregulation. This conjecture is supported in Jayaratne and Strahan (1996), who find that states' growth rates increased once branching restrictions were removed.

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 efficiency and lower loan rates. Section IV provides evidence on the process of selection that generated efficiency gains. 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 the action. 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.

Interstate banking activity has increased sharply as a result of deregulation. 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 relationship 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 thirteen states allowed unrestricted intrastate branching in 1974. During the next two and a half decades, thirty-five 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 1995). 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.[3]

Table 1 describes the history of the deregulation of restrictions on intrastate branching and interstate banking since 1970.[4] 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.[5] 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.[6]

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[3] Moore (1995) 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.

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

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

[6] 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

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 reflect 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 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 multibank holding companies in 1957. However, most states did allow intrastate MBHC expansion. By 1975, the beginning of our sample period, thirty-five 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

In this section, we consider how deregulation affected producers and consumers in the banking industry. First, we estimate changes after deregulation in two conventional indicators of the well-being of firms: accounting measures of profitability and operating costs. Previous

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results are not sensitive to the alternative dating of deregulation in all four states.

studies of entry and price deregulation in other multifirm industries generally show that costs fall following deregulation. By contrast, the evidence on the impact of deregulation on profits in other industries is mixed. Trucking industry profits declined after deregulation while airline and railroad profits increased (Winston 1993), suggesting that when the deregulated industry is highly competitive (as it is in trucking), increased competition depresses profits more than the reduced costs boost them.

Second, we look at changes in loan losses following deregulation. This measure of performance, unique to the banking industry, can be thought of as another component of costs since loan losses directly reduce banks' profits. Bank profits, for example, are reported net of loan loss provisions. Moreover, loan losses are positively correlated with measures of managerial inefficiency (X-inefficiency) derived from estimates of bank cost functions (Berger and DeYoung 1995, Peristiani 1996). Yet another reason for paying attention to loan losses is that they are an indicator of the quality of bank lending. Given the specialized role of banks as intermediaries that ameliorate frictions in financial markets and thereby improve the functioning of capital markets, improved bank intermediation increases the efficiency of the financial system and, in turn, the rate of economic growth (Jayaratne and Strahan 1996) .

In the second part of this section, we estimate how prices (deposit and loan interest rates) change after deregulation. Again, previous research has found that prices generally fall following deregulation, leaving consumers better off (Winston 1993).

In our empirical analysis, we present estimates of changes in aggregate measures of profits, costs (operating costs and loan losses), and prices following deregulation. We focus on state-level data here because, as we show later, deregulation enhances the natural tendency of

markets to weed out inefficient firms. By constructing a balanced panel of state-level aggregates, we avoid selection and survivorship problems that would bias tests based on data from individual banks. Changes in aggregate data on the banking industry as a whole will capture the impact of any selection process, as well as other effects, following deregulation. In Section IV, we use bank-level data to demonstrate the importance of selection effects following deregulation.

A. Profits and Costs

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. The result is the weighted average of bank profitability. (For example, the return on assets variable used here is the asset-weighted average return on assets of individual banks.) The profitability data are taken from year-end *Quarterly Reports of Income and Condition* (Call Reports) for 1975 to 1992.

We measure *operating costs* using the log of total non-interest expenses. Again, we construct a state-level aggregate by summing total non-interest expenses for all banks operating in a given state. These data are available from the Call Reports beginning in 1984.

For loan losses, we consider a contemporaneous as well as backward-looking and forward-looking measures of the health of the loan portfolio. The fraction of total loans classified as "non-performing" provides a snapshot of the current health of the loan portfolio.[7]

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

End-of-year non-performing loan amounts for all banks over the 1982-92 period are taken from Call Reports. A state-level aggregate non-performing loan amount is derived by summing over all banks in each state. The variable of interest is the ratio of *non-performing loans* to total loans held by all banks in each state. Our second, more backward-looking loan loss variable is the fraction of loans written off during the year. This variable, *net charge-offs* (gross charge-offs less recoveries), reflects realizations of losses on loans made in the past and is again taken from end-of-year Call Reports over the 1976-92 period. State-level net charge-offs are derived, and the dependent variable is the ratio of charge-offs to total loans. Finally, we use *loan loss provisions* to total loans as a forward-looking measure of loan quality. Loan loss provisions are intended to measure banks' expected losses on the current loan portfolio.

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 fixed effects model:

$$\begin{aligned} Perf_{t,i} = {} & \alpha_t + \beta_i + \gamma_1 Branch_{t,i} + \gamma_2 Bank_{t,i} + \delta_1 Perf_{t-1,i} + \delta_2 Perf_{t-2,i} \\ & + \eta_1 PIG_{t,i} + \eta_2 PIG_{t-1,i} + \eta_3 PIG_{t-2,i} + \eta_4 PIG_{t-3,i} + \epsilon_{t,i} \end{aligned}$$

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[8]; γ_1 and γ_2 measure the changes in performance stemming from the two types of deregulation.[9] The lags of the dependent variable are included to control for cyclical movements in the dependent variable beyond those captured by the national and local business cycle. Note that by including these lags, the coefficients on the deregulation indicators measure the initial effect of deregulation on the dependent variable. As we will show, the long-run effects are generally larger.[10]

The results of the basic models outlined above appear in Table 2. As shown in the first two columns, profits increase slightly following branching deregulation, although the change in return on assets is not statistically significant at conventional levels and the rise in return on equity is only significant at the 10 percent level. Following interstate banking, return on equity and return on assets also rise, but again the increases are not statistically significant.

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[8] Jayaratne and Strahan (1996) show that the rate of economic growth increases after branching deregulation, probably because the quality of bank intermediation improves after deregulation (as reflected in the lower levels of bad loans). In that event, the economic growth rate is endogenous in the empirical model above. Nevertheless, we include *PIG* as a regressor because we want to control for the possibility that states may have deregulated during a trough of the state business cycle (as discussed later). However, all results presented hereafter remain unchanged if we were to drop *PIG* from the regressions.

[9] 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 because they liberalized their usury laws to encourage credit card banks to operate there.

[10] Since we include two lags of the dependent variable, we lose data at the beginning of the period for operating costs, non-performing loans, and charge-offs. Since non-performing loans and operating costs are only available from 1982 and 1984 onward, this loss of data reduces the power of our tests dramatically, since the fixed-effects estimator is driven by changes in each state's regulatory status. To allow us to preserve the data all the way back to 1982 (1984) for these two variables, we construct an instrument for the lagged dependent variable. For non-performing loans, the instrument is constructed from loan charge-offs and provisions; for operating costs, the instrument is constructed from expenses on salaries and fixed assets.

Column three of Table 2 presents the results of the operating cost regression. Here, we find a statistically significant decline in total non-interest expenses following both deregulation of branching restrictions and again following deregulation of interstate banking. Non-interest expenses consist of salaries, expenses on fixed assets (e.g., rent), and other non-interest expenses. Looking at these components separately, we find that salaries per worker decline while the total number of workers rises after deregulation, leaving total salary expenses roughly unchanged. Thus, banks seem to be able to hire more workers after deregulation for the same total cost. Although we find no change in expenses on fixed assets, other non-interest expenses fall significantly after deregulation.[11]

The last three columns present the changes in bank loan performance. Like operating costs, all three measures of loan losses decrease following branch deregulation. We do see small declines in non-performing loans and loan loss provisions after interstate banking deregulation, but these declines are not statistically significant.

The improvements in loan losses, along with the declines in operating costs, suggest that banks are, on average, operating more efficiently following deregulation. These estimated improvements are economically, as well as statistically, large. For instance, the average decline in loan loss provisions following branching deregulation during our sample period is 0.48 percent, or about half of the unconditional mean. (This estimate is based on the coefficient on the deregulation indicator that we observe when we drop the lags of the dependent variable from

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[11] The "other non-interest" expenses category includes amortization of intangible assets such as goodwill, losses on real estate owned, losses on sales of loans and fixed assets, fees paid to directors, insurance premia, legal fees, marketing and advertising costs, and other non-interest costs.

the specification in Table 2.) Based on this estimate, had all states imposed branching restrictions in 1992 (when all but three states allowed statewide branching), loan loss provisions would have been about $9 billion higher than if no state had restricted branching (0.0048 * total loans in 1992 [$1.9 trillion]).[12]

Similarly, operating costs fall by 8.3 percent after deregulation in the model without lags of the dependent variable. Multiplying this by total non-interest expenses incurred by all banks operating in 1992 suggests operating costs would have been approximately $9.8 billion per year higher if all states disallowed statewide branching in 1992.

B. Prices

Table 3 provides estimates of changes in deposit and loan prices following deregulation using the same empirical method outlined above. In particular, we construct state-level aggregate measures of prices and then estimate the changes in those prices following deregulation in a model with state and time fixed effects, controls for state-level business cycles, and lags of the dependent variable.

Our measure of deposit price is the average interest rate, net of fees, paid on small, domestic deposits. This variable equals total interest expenses on domestic deposits under $100,000, minus income from deposit fees, divided by total domestic deposits under $100,000. These data are available for all banks from the 1976-92 Call Reports.

[12] This calculation is actually an upper bound on the decline in loan losses since we are using total loans in 1992, when all but three states had deregulated their branching restrictions.

For loan prices, we construct the average yield on all loans by dividing total interest income on loans and leases by total loans and leases, again aggregated up to the state level. These data are also available for all banks from the 1976-92 Call Reports.

As reported in Table 3, loan prices fall significantly following branching deregulation. The coefficient on the branching deregulation indicator is negative and statistically significant at the 5 percent level. The model without lags of the dependent variable suggests declines of about 0.3 percentage points following branching deregulation. Note that this decline is about two-thirds of the decline in loan loss provisions, suggesting that most of the reductions in loan losses are passed along to banks' borrowers. Multiplying the loan price reduction by total loans outstanding as of 1992 yields a rough estimate of the gains to borrowers of about $6 billion per year.[13] [14]

We do not, however, find increases in deposit interest rates following branching deregulation. On the other hand, these rates do increase following interstate banking deregulation. As we will show below, however, the observed increase occurs because deposit interest rates are unusually low just before states enter interstate banking agreements.

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[13] Unless loan demand is perfectly price-inelastic, the $6 billion is an overestimate of the increase in consumer surplus.

[14] Since banks' costs and loan rates decline after statewide branching, we would expect the volume of loans to increase after deregulation. Jayaratne and Strahan (1996) show that the rate of growth of bank lending increases after branching deregulation in larger states (but no change is observed in smaller states).

C. Robustness Tests

Omitted Variables

The reduced-form regressions in Tables 2 and 3 provide estimates of the *total* effects of deregulation on costs and prices. But the output mix of banks may have changed as a consequence of changes in costs. For instance, if loan losses on one class of loans fell by more than another class of loans, and if that loss reduction were passed along to borrowers, then we would expect to observe an increase in the share of the class of loans experiencing the larger reduction in loan losses following deregulation. If, as a consequence, the output mix shifted toward safer loans, then our estimates of the changes in loan losses in Table 2 would be biased downward (away from zero). That is, the decrease in loan losses observed in Table 2 may be due to banks making safer loans and not due to banks screening and monitoring borrowers better. In addition, loan yields may have decreased because of safer lending by banks and not because of competitive pressure to pass along to consumers reduced costs associated with loan losses. Similarly, operating costs may have declined because bank output (loans and deposits) may have decreased.

To account for this possibility, Table 4 reports the results of the operating cost, loan losses, and loan pricing regressions controlling for the output mix. In the operating cost regression, we control for bank "output" by including the log of small deposits, and the log of total credit card loans, commercial loans (commercial and industrial (C&I) loans plus commercial real estate loans), and other loans. In the loan losses and loan pricing regressions, we control for the riskiness of the loan portfolio by including the fraction of total loans in credit

cards and in commercial loans, the two riskiest categories of loans.[15] In each of the five cases, we find that the improvements in costs and reductions in loan losses and loan prices remain statistically significant even after controlling for the output mix. We also find no decrease in the two risky loan categories--credit cards and commercial loans--following branch deregulation, suggesting that banks did not shift to safer loans after deregulation. Evidently, safer lending is not responsible for decreased loan losses and loan rates after deregulation, and reduced bank output is not responsible for lower operating costs after statewide branching.

Of course, it is possible that *within* each category of loans, banks are making safer loans after deregulation. So, although banks are not making fewer commercial loans and credit card loans after deregulation, perhaps they are making safer commercial loans and credit card loans. This is unlikely, since Keeley (1990) shows that banks *increased* their risk taking after geographic deregulation because eliminating entry barriers reduced banks' franchise value (as measured by Tobin's Q--probably due to reduced market power). Moreover, in Section IV of this paper we show that banks with fewer loan losses grew faster than banks with more loan losses once branching was permitted. Thus, the change in loan losses reflects not the inherent riskiness of the borrowers but the improved quality of the banking system's screening and monitoring of borrowers.

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[15] Ideally, one would like to measure changes in loan losses and prices for each major category of bank loans (C&I, credit card, and real estate). Unfortunately, charge-offs are only available by loan type beginning in 1984 and non-performing loans by loan type beginning in 1987. Loan loss provisions are not collected by loan type. Interest income on loans is available by loan type back to 1984. We found, however, that these data are less reliable than the total interest income on all loans and leases.

Are Cost and Price Declines Widespread?

We have also checked whether our results are driven by changes in costs or prices in any one particular state. In fact, we find the improvements after branching deregulation to be a general phenomenon. For instance, in all but one of the deregulating states (New Hampshire), loan losses decline after branching deregulation relative to states that did not deregulate. Similarly, we find that loan prices improve in deregulating states, again relative to non-deregulators, in two-thirds of the cases. Again, we find that New Hampshire is a significant outlier. It turns out that New Hampshire deregulated its branching restrictions just prior to the New England banking crisis of the late 1980s and early 1990s. As a consequence, loan losses and loan yields were substantially above the national average in New Hampshire just after branching deregulation.

This robustness is illustrated in Figures 1 and 2. Here, we look separately at each deregulating state by comparing the change in its average loan loss provisions to total loans ratio (Figure 1), and the change in its average loan yield (Figure 2) with the corresponding change for a control group of states over the same period. Each of the deregulators appears as a pair of points on the graph: for instance, the state's two-letter postal code name indicates the change in loan losses in that state (the "treatment state") following deregulation; a diamond appears directly above (or below) the state name, indicating the change over the same period for all states that did not alter their regulatory regime during this period (the "control group"). For example, in Figure 1 Oklahoma (represented as "OK" in the bottom left corner) is recorded as having decreased its mean loan loss provisions ratio following branching reform in 1988 by about 0.75 percentage points. The associated diamond above OK indicates that all

states that did not change policy in 1988 experienced an *increase* in loan loss provisions of about 0.75 percentage points over the same period.[16]

The Timing of Deregulation

Another possible explanation for the observed reductions in costs and loan losses 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 losses.[17] This possibility is suggested by the fact that twenty-five of the thirty-five states that deregulated their branching restrictions during the sample period changed policy after 1984, the first of many years of dramatically increased bank failure rates.[18] 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 weed out weaker banks.[19]

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[16] Figures for charge-offs and non-performing loans look similar to those in Figure 1.

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

[18] 1,296 banks were subject to FDIC intervention over the nine year interval between 1984 and 1992. In contrast, a mere twenty-five banks failed over the nine years prior to 1984 (FDIC 1993).

[19] Kane (1996) cites increased failure rates among financial institutions in the 1980s as a reason for the wave of geographic deregulation during that decade.

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 personal income growth and lags of the dependent variable in our regression, we have controlled explicitly for state-specific business cycles as well as for cycles in the banking sector. The estimated effect of branching and interstate banking on bank performance is not biased by any correlation between these deregulations and the business cycle. Jayaratne and Strahan (1996) show that states were just as likely to deregulate branching restrictions during the downswing of the business cycle as during the upswing.

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 by adding an indicator variable during the five-year window before branching deregulation and another indicator during the five-year window before interstate banking deregulation. In the operating cost and loan losses regressions, we find that the coefficient on the pre-branching indicator is not statistically significant. In the loan pricing regressions, although we find a significant increase in loan prices during the five-year window before deregulation, this increase is driven by the unusual circumstances of North Dakota, whose economy experienced extreme volatility just prior to its

deregulation of branching. When we drop North Dakota, the pre-branching indicator is not significant in the loan pricing model.

On the other hand, we do find significant improvements in non-performing loans, charge-offs, and loan loss provisions both five years before as well as after interstate banking deregulation. Similarly, we find that deposit interest rates are unusually low just prior to interstate banking deregulation (i.e., the coefficient on the pre-interstate banking indicator is negative and significant in the deposit pricing regression). This may mean that states prefer to enter interstate banking agreements when their banks are particularly healthy (strong supply of deposits, low loan losses) and therefore well-positioned to be taken over at a high price.[20] On the other hand, banks may anticipate deregulation and change their behavior in advance, perhaps because bank managers recognize an increased threat of takeover.[21]

We conclude that the observed improvements in bank efficiency after branch deregulation were not due to the timing of that deregulation. While we also find important changes associated with interstate banking deregulation, we cannot be sure how much of those changes should be attributed to the timing of deregulation and how much should be attributed to the beneficial effects of the deregulation itself. We therefore focus exclusively on branching deregulation in the next section, where we use banking company level data to explore why costs and prices fall following deregulation.

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[20] To the extent that banks' balance sheets are less opaque during good times, acquirers will be willing to pay more to purchase banks than during bad times. That is, the "lemons problems" resulting from private information about the true value of bank loans may be least severe during good times.

[21] These results are omitted for brevity but are available on request. We also estimated these models with three-year windows instead of five-year windows and got similar results.

IV. How Did Branching Deregulation Improve Bank Performance?

We have shown that loan losses and operating costs fall dramatically following intrastate branch deregulation. All of the benefits occur after deregulation, not before, suggesting that the branching policy change helped improve banking. Most of the decrease in costs appears to have been passed along to bank borrowers in the form of lower loan rates, leaving bank customers better off after deregulation.

Why did banks perform better after branching was permitted? In this section, we argue that most of this improvement occurred because deregulation allowed better-performing banks to grow relatively faster. In other words, branching restrictions reduced the performance of the average bank asset because they constrained the growth opportunities of better-run banks. In the remainder of this section, we test (and confirm) two implications of this selection hypothesis. First, we show that bank assets were substantially redistributed following branching deregulation as better-run banks increase their share of bank assets. Second, we show that the changes in the size distribution favored the ex ante better-run banks.

Of course, there may be other reasons for the observed improvement in bank performance following geographic deregulation. Limits to branching and mergers and acquisitions across state lines may have exacerbated 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. The banking system improves because managerial effort increases for all banks. This conjecture is supported by Hubbard and Palia (1995), who find that banks' CEO turnover increases and the pay-performance relationship tightens once states allow interstate banking.

To directly test this "disciplining conjecture," we require measures of the extent of the owner-manager agency problems. The disciplining hypothesis would be strongly supported if measures of agency costs improve for most banks after deregulation, and if those banks with the greatest management slack prior to deregulation improve performance the most after deregulation. Unfortunately, we do not have reliable indicators of managerial slack. Absent such data, we focus on testing the selection hypothesis.[22] Although it is possible that greater managerial discipline may account for some of the observed increase in banks' efficiency, we find that selection accounts for most of the improvements noted before in Table 2. [23]

Average bank efficiency may also have increased following deregulation because 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

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[22] 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.

[23] 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). We find that the cross-sectional variability in almost all the performance measures reported in Table 2 decreases after branching.

economies in banking, at least for banks with total assets above $500 million (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 ones, a finding inconsistent with the economies-of-scale explanation.[24]

A. The Bank Size Distribution Changes after Deregulation

Table 5 confirms that there was a large redistribution of bank assets after statewide branching was permitted. The first column of that table shows that the log of the state-level Herfindahl-Hirschmann Index (HHI) of bank deposit concentration increased after branching.[25] The model without lags of the dependent variable suggests a long-run increase in the HHI of close to 30 percent.[26] In contrast to branching deregulation, state-level bank concentration

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[24] Results are available on request.

[25] The state-level HHI is calculated by first estimating the share of statewide bank deposits held by each banking company, and then squaring and summing these shares. The resulting number ranges from 0 (when each firm holds a minute fraction of statewide bank assets) to 10,000 (a monopoly).

[26] Results are available on request.

decreased once interstate banking was allowed, perhaps because of the entry of out-of-state banking companies.

The increase in the HHI suggests that banking assets were more concentrated after branching. At least part of this increased concentration is due to small banks losing market share (column 2, Table 5). Banks with less than $100 million in assets lost about 3.5 percentage points in their share of statewide banking assets based on the model without lags of the dependent variable. This represents about a 17 percent decline in the typical state's small bank share.

Finally, the redistribution of bank assets after branching was not driven by increased takeover activity. In column 3 of Table 5, the dependent variable is the percentage of bank assets that change hands each year in each state between 1975 and 1992. The "acquisition rate" is 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. Only those transactions that involve a genuine change of corporate control are included.[27] We find that takeover rates increased after interstate banking was deregulated but not after branching was permitted.[28] This suggests that

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[27] 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. The takeover data are taken from Rhoades (1986) and Rhoades (1996). We thank Stephen Rhoades for providing us this information.

[28] We also estimated the model in column 3, Table 5, with three-year and five-year windows after deregulation and found no increase in takeover rates in the year immediately after branching deregulation.

some banks grew following branching deregulation through internally generated growth (e.g., de novo branching) or through branch purchases.[29]

B. Deregulation Enhances the Growth of Efficient Banks

Thus far, we have shown that there was a substantial redistribution of bank assets after deregulation of statewide branching, consistent with the selection hypothesis. A second implication of the selection hypothesis is that better-run banks should be the beneficiaries of this asset redistribution because they grow faster after deregulation than poorly run banks. We test this implication by using profitability and loan losses of individual banks as "noisy" indicators of management quality, and then asking whether banks with high profits and few bad loans before deregulation grew relatively faster after branching deregulation.

To test this implication of the selection hypothesis, we rely on banking company-level data in the remainder of this section.[30] The statewide aggregate data used in the previous section captured the combined effects of all changes in the banking system that may have affected bank performance following deregulation, possibly including changes in managerial discipline and reduced scale inefficiencies as well as improved selection. In contrast, banking company-level

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[29] Banks may find it cheaper to expand by buying branches rather than buying entire banks for at least two reasons. First, if banks have private information about some of their assets, the market for these assets will be characterized by a "lemons" problem. Branch purchases allow the buyer to pick and choose assets that are easier to value and hence suffer less from lemons problems. In contrast, bank purchases require the buyer to take on the entire asset portfolio of the target, more- as well as less-transparent assets. Second, the costs associated with regulatory approval of branch purchases are probably less than the regulatory costs of bank purchases.

[30] A banking company is defined here to be the combined balance sheet of all commonly owned banks. However, if a bank holding company operates in multiple states, then its subsidiaries in each state are grouped together as a separate entity. (This is necessary because states deregulated at different times.)

data allow us to distinguish the effects of selection from other possible sources of bank performance improvements.

For each state, we construct the return on equity, return on assets, and the ratios of charge-off, loan loss provisions, and non-performing loans to loans for all banking companies (independent banks and bank holding companies) operating in the state during three years: the year just prior to branching deregulation, the seventh year prior to deregulation, and the fifth year after deregulation. We then compute asset growth rates from the seventh year before deregulation to one year prior to deregulation, and from the year prior to deregulation to five years after deregulation. In other words, we have two windows: a six-year window before branching deregulation and another six-year window after deregulation.[31]

Table 6 tests whether ex ante better-performing banks grow faster once branching is allowed. The dependent variable is the annual growth rate of each banking company's assets over the two six-year windows constructed as described before.[32] The independent variables of interest are ex ante performance measures. We interact the performance measures with an

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[31] We chose these window lengths because most of the observed changes in bank structure occurred within five years after branching deregulation. For example, nearly two-thirds of the 30 percent increase in the state-level bank asset concentration (the HHI) occurred within five years of branching deregulation. Similar results are reported in Berger, Kashyap and Scalise (1995), who find that most changes to bank structure occur within five years of geographic deregulation. (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].)

[32] We have also estimated the model in Table 6 using the growth rate of each banking company's assets relative to the average growth rate of assets in the same state and over the same period. These results are very similar to those presented in Table 6 and are available on request.

indicator equal to 1 during the deregulated period to test whether deregulation enhanced selection--if it did, we should see ex ante performance measures acting as better predictors of future growth after deregulation. The model is estimated on the pooled data set with bank-specific fixed effects. We also control for bank size, since large banks may be expected to grow relatively slowly, and capital, since regulatory capital adequacy standards may constrain growth.

Our performance measures are based on a bank's position relative to its peers.[33] High performers are those banks that are above the median in return on assets or return on equity, or below the median in net charge-offs, loan loss provisions, or non-performing loans.[34] This procedure yields a discrete performance measure. We also construct a continuous performance measure by taking the difference between each bank's profitability (loan losses) and the profitability (loan losses) of the average bank in that state in that year, divided by the standard deviation of bank profitability in that state and year.

Table 6 shows that banks that had higher profits and fewer loan losses in the year before branching was allowed subsequently grew faster than initially poorer-performing banks. For example, a banking company with a return on assets one standard deviation above average grew 0.79 percentage points faster per year than an average performer (column 1). Banking companies with above-median return on assets grew 1.46 percentage points faster than banks with below-

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[33] We do not include operating costs in this analysis, however, since total non-interest expenses are only available beginning in 1984. As a result, the analysis in Table 6 could have been done for banks in only three states for this variable.

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

median return on assets after branching was allowed (column 2). The other ex ante performance measures also predict growth after branching deregulation This is consistent with the selection hypothesis. By contrast, we find no significant relationship between ex ante performance and growth during the regulated period.[35]

The results in Table 6 support the selection hypothesis by showing that the average bank that grew after branching deregulation was a high-profit bank with lower-than-average loan losses.[36] To what extent can this selection process explain the improvements in aggregate, state-level banking performance observed in Table 2? For example, Table 2 shows that the asset-weighted average of bank loan loss provisions decreased by 48 basis points after statewide branching was permitted (based on the model without lags of the dependent variable). What fraction of this improvement can be explained by the selection process? Although we have shown (in Table 6) that *on average* better-performing banks grew relatively faster after branching

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[35] The positive correlation between initial bank profitability and subsequent asset growth may be due to the fact that banks facing better loan demand and investment opportunities are likely to show superior performance and faster growth. If the positive correlation between initial bank performance and subsequent bank growth is purely due to local demand conditions, then initial bank performance should predict subsequent bank growth before deregulation as well as after deregulation. Assuming that this "bias" remains constant over time, any additional growth-performance correlation after deregulation may be attributed to increased selection once branching is permitted. Table 6 shows that *prior* to branching, there was no statistically significant relationship between initial bank performance and subsequent asset growth. This suggests that the positive correlation between performance and asset growth after branching is due to selection.

[36] The results in Table 6 are based only on banking companies that survive to the end of the period. We have also estimated the same model with banks that do not survive by coding their end-of-period assets as zero and using the corresponding annual asset growth rate as the dependent variable. (In this specification, we use the simple asset growth rate since the continuously compounded, annual growth rate is undefined for banks whose assets reach zero). When we include these non-surviving banks, we find that the coefficient on ex-ante performance is larger (in absolute value) than when these non-survivors are excluded.

deregulation, we have not shown that *most* of the redistribution of assets after branching deregulation was toward relatively better-performing banking companies. The results in Table 6 do not rule out the possibility that a few large, poorly performing banks increased their share of bank assets the most. If this were true, then selection may account for little of the post-deregulation efficiency improvements.

To quantify the effects of selection on loan losses (and thereby to further test the selection conjecture) we conduct a simulation exercise in Table 7. The premise of the exercise is as follows: Table 2 shows that the asset-weighted average bank efficiency improves following branching deregulation. If the selection hypothesis is correct, then most of this improvement is due to more efficient banks expanding their assets and thereby receiving more weight in the asset-weighted average. If only selection is at work once branching is allowed, then the redistribution of assets from high-cost banks to low-cost banks would account for the entire reduction in the asset-weighted average performance measures.

The simulation exercise in Table 7 tests this implication of the selection hypothesis as follows: first, we calculate the asset-weighted average (across banking companies) of one of our performance measures--say, loan loss provisions--in the year before deregulation. Next, we compare that with the average when the asset weights are based on the distribution of assets observed five years after deregulation. If, as the selection hypothesis predicts, most of the redistribution of bank assets after branching deregulation goes from inefficient banks toward efficient banks, then the asset-weighted average loan losses based on bank sizes observed five

years after deregulation should be less than the asset-weighted loan losses based on bank sizes observed the year before deregulation.[37]

This prediction of the selection conjecture is confirmed in Table 7. The asset-weighted average loan loss provisions in the year before deregulation was 1.32 percent (column 3, Table 7). Based on the asset distribution observed five years later (but holding the banks' loan loss provisions at their pre-deregulation levels), the average decreases to 0.90 percent (column 4, Table 7). Of course, this improvement need not be entirely due to the faster growth of more efficient banks. Instead, it may be due to the relatively faster growth of banks fortunate enough to be in robust local economies. To account for this possibility, we conduct the same re-weighting exercise as above for the six-year window prior to branching deregulation (columns 1 and 2, Table 7). There, we find that although the reweighted loan loss provisions average is smaller, the decrease is less than that observed for the period after deregulation (the decrease is from 0.59 percent to 0.49 percent). Using a difference-in-differences approach, these estimates suggest that selection effects could account for a decrease of 0.32 percentage points ([1.32-0.9]-[0.59-0.49]). That is, about two-thirds of the 48 basis-point drop in loan loss provisions (in the model without lags) may be explained by the redistribution of bank assets from less efficient to more efficient banks. Similarly, about half of the decrease in net charge-offs and three-quarters

[37] The banking company loan loss provisions are held constant at their levels as of the year before deregulation. This way, we hold constant other factors (such as managerial disciplining) that may have improved performance following deregulation.

of the decrease in non-performing loans (again, in the model without lags) can be explained in terms of selection.[38]

It is noteworthy that the simulation exercise in Table 7 suggests that not only did much of the asset redistribution after branching favor banking companies with relatively low loan losses, but also that the redistribution favors initially high-profit banks. Yet, we do not see a strong increase in asset-weighted profitability after deregulation (Table 2). The reason may be that assets are redistributed after deregulation because of greater competition among banks (suggested by decreased loan rates), which also decreases profits across the board.

V. Conclusion

In this paper, we find evidence that longstanding 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 efficiency of the average banking asset. Once branching restrictions were lifted, the efficiency of the banking system improved, and bank borrowers benefited from lower loan rates.

Restrictions on interstate banking may have had similar effects. Indeed, we find substantial reductions in loan losses and operating costs after interstate banking is permitted, as

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[38] 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 twenty out of thirty-one cases, we find that reweighting 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.

we did after states allowed statewide branching. At least part of the improved bank performance associated with interstate bank deregulation, however, is probably due to the timing of such deregulation since, in contrast to branching, we observe efficiency improvements *before,* as well as after, interstate banking.

Reduced loan losses in the banking system following branch deregulation may have implications beyond increased profits to banks and decreased loan rates to bank borrowers. To the extent that loan losses decrease because banks improve their monitoring and screening of their borrowers (and we have shown that loan losses did not shrink because banks made safer loans after deregulation), branch deregulation may have helped improve the quality of bank intermediation. The extensive literature on the importance of banks in producing information suggests that improved bank intermediation would have improved the efficiency of capital markets in allocating resources to the highest return investments. This is supported in Jayaratne and Strahan (1996), who find that the positive shock to the banking system that occurred with branching deregulation significantly increased the growth rate of states' economies for at least ten years.

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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 Measures of Bank Performance Following Intrastate Branch and Interstate Bank Reform

	Profitability			*Loan Quality*		
	Net Income/ Total Assets *(ROA)* (1)	Net Income/ Equity *(ROE)* (2)	Log of Non-Interest Expenses (3)	*Non-Performing Loans/ Total Loans* (4)	*Net Loan Charge-offs/ Total Loans* (5)	*Loan Loss Provisions/ Total Loans* (6)
Intrastate Branching Indicator	0.0005 (1.15)	0.0126 (1.66)	-0.045 (2.72)*	-0.0033 (2.30)*	-0.0028 (4.75)*	-0.0029 (4.00)*
Interstate Banking Indicator	0.0003 (0.67)	0.0069 (1.02)	-0.0495 (3.28)*	-0.0019 (1.44)	0.0001 (0.17)	-0.0004 (0.53)
Lagged Dependent Variable	0.6847 (6.61)*	0.5704 (5.40)*	0.5900 (5.20)*	0.8734 (8.64)*	0.6521 (3.10)*	0.5817 (6.32)*
Lagged Dependent Variable (Lagged 2 Periods)	-0.3124 (3.03)*	-0.2363 (2.91)*	-0.1767 (1.72)	-0.4192 (5.35)*	-0.2026 (1.96)*	-0.2201 (2.83)*
State Personal Income Growth	0.0353 (4.58)*	0.5525 (4.81)*	-0.9288 (3.43)*	-0.1816 (5.00)*	-0.0506 (3.30)*	-0.0537 (4.69)*
Personal Income Growth (Lagged 1 Period)	0.0188 (3.01)*	0.3128 (3.13)*	-0.1929 (0.72)	-0.0800 (3.20)*	-0.0398 (2.70)*	-0.0248 (2.52)*
Personal Income Growth (Lagged 2 Periods)	0.0105 (2.13)*	0.1450 (1.84)	-0.1683 (0.54)	-0.0194 (0.72)	-0.0283 (2.55)*	-0.0149 (2.13)*
Personal Income Growth (Lagged 3 Periods)	0.0077 (1.01)	0.0768 (0.79)	0.762 (2.72)*	-0.0055 (0.24)	-0.0013 (0.13)	-0.0086 (0.43)
Adjusted R-Squared	54.9%	46.8%	99.6%	74.5%	61.8%	57.7%
Sample Period	1975-1992	1975-1992	1984-1992	1982-1992	1978-1992	1975-1992
N	802	802	376	468	658	802
Dependent Variable Mean	0.75%	10.66%	13.83	2.67%	0.72%	0.86%

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. The lagged dependent variables for the model with non-performing loans is based on a predicted value of that variable based on chargeoffs and loan loss provisions. The lagged dependent variable in the model with non-interest expenses is based on a predicted value of that variable based on the log of salary expenses and the log of expenses on fixed assets.

Table 3

Changes in Deposit and Loan Prices Following Intrastate Branch and Interstate Bank Reform

	(Deposit Interest-Fees)/ Domestic Deposits (1)	*Interest on Loans+ Leases / Loans + Leases* (2)
Intrastate Branching Indicator	-0.0003 (1.03)	-0.0019 (2.22)*
Interstate Banking Indicator	0.0009 (2.74)*	-0.0001 (0.18)
Lagged Dependent Variable	0.9235 (15.83)*	0.5475 (5.92)*
Lagged Dependent Variable (Lagged 2 Periods)	-0.1865 (3.49)*	0.1081 (1.21)
State Personal Income Growth	-0.0104 (2.32)*	-0.0117 (1.01)
Personal Income Growth (Lagged 1 Period)	0.0062 (1.12)	0.0165 (1.20)
Personal Income Growth (Lagged 2 Periods)	0.0019 (0.41)	-0.0039 (0.38)
Personal Income Growth (Lagged 3 Periods)	0.0131 (2.83)*	0.0157 (1.54)
Adjusted R-Squared	96.53%	90.08%
Sample Period	1978-1992	1978-1992
N	658	658
Dependent Variable Mean	4.04%	10.87%

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. Note that the yield on deposits does not include jumbo CDs.

Table 4
Changes in Bank Operating Costs and Lending Quality Following Intrastate Branch and Interstate Bank Reform
Controlling for Output Mix

		Loan Quality			*Interest on Loans+ Leases / Loans + Leases*
	Log of Non-Interest Expenses (1)	Non-Performing Loans/ Total Loans (2)	Net Loan Charge-offs/ Total Loans (3)	Loan Loss Provisions/ Total Loans (4)	(5)
Intrastate Branching Indicator	-0.0270 (2.00)*	-0.0035 (2.55)*	-0.0028 (4.84)*	-0.0028 (3.78)*	-0.0021 (2.75)*
Interstate Banking Indicator	-0.0420 (3.68)*	-0.0019 (1.47)	0.0001 (0.09)	-0.0004 (0.50)	-0.0013 (1.83)
Log of Credit Card Loans	0.0399 (2.89)*	-	-	-	-
Log of Commercial Loans	0.1069 (3.76)*	-	-	-	-
Log of Other Loans	0.0347 (1.12)	-	-	-	-
Log of Small, Domestic Deposits	0.3287 (3.24)*	-	-	-	-
Credit Card Loans/Total Loans	-	0.0099 0.91	0.0172 (3.04)*	0.0241 (2.99)*	0.0580 (5.59)*
C&I +Commercial Real Estate Loans /Total Loans	-	0.0426 (3.56)*	0.0147 (2.46)*	0.0228 (2.79)*	0.0321 (4.85)*
Lagged Dependent Variable	0.2748 (3.07)*	0.8549 (8.45)*	0.6395 (3.07)*	0.5595 (6.01)*	0.4145 (4.52)*
Lagged Dependent Variable (Lagged 2 Periods)	0.0244 (0.30)	-0.3718 (4.74)*	-0.1846 (1.79)	-0.2018 (2.64)*	0.0405 (0.52)
State Personal Income Growth	-0.5643 (2.47)*	-0.1658 (4.60)*	-0.0475 (3.24)*	-0.0497 (4.47)*	-0.0131 (1.16)
Personal Income Growth (Lagged 1 Period)	-0.1132 (0.50)	-0.0756 (2.99)*	-0.0386 (2.66)*	-0.0228 (2.36)*	0.0142 (1.06)
Personal Income Growth (Lagged 2 Periods)	-0.3568 (1.37)	-0.0128 (0.48)	-0.0267 (2.43)*	-0.0127 (1.89)	-0.0032 (0.33)
Personal Income Growth (Lagged 3 Periods)	0.2116 (3.07)*	-0.0071 (0.31)	-0.0028 (0.29)	-0.0102 (0.95)	0.0123 (1.11)
Adjusted R-Squared	99.6%	75.0%	62.7%	59.2%	91.63%
Sample Period	1984-1992	1982-1992	1978-1992	1975-1992	1978-1992
N	376	468	658	802	658
Dependent Variable Mean	13.83	2.67%	0.72%	0.86%	10.87%

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. The lagged dependent variables for the model with non-performing loans is based on a predicted value of that variable based on chargeoffs and loan loss provisions. The lagged dependent variable in the model with non-interest expenses is based on a predicted value of that variable based on the log of salary expenses and the log of expenses on fixed assets.

Figure 1

Change in Mean Loan Loss Provisions after Branching Deregulation

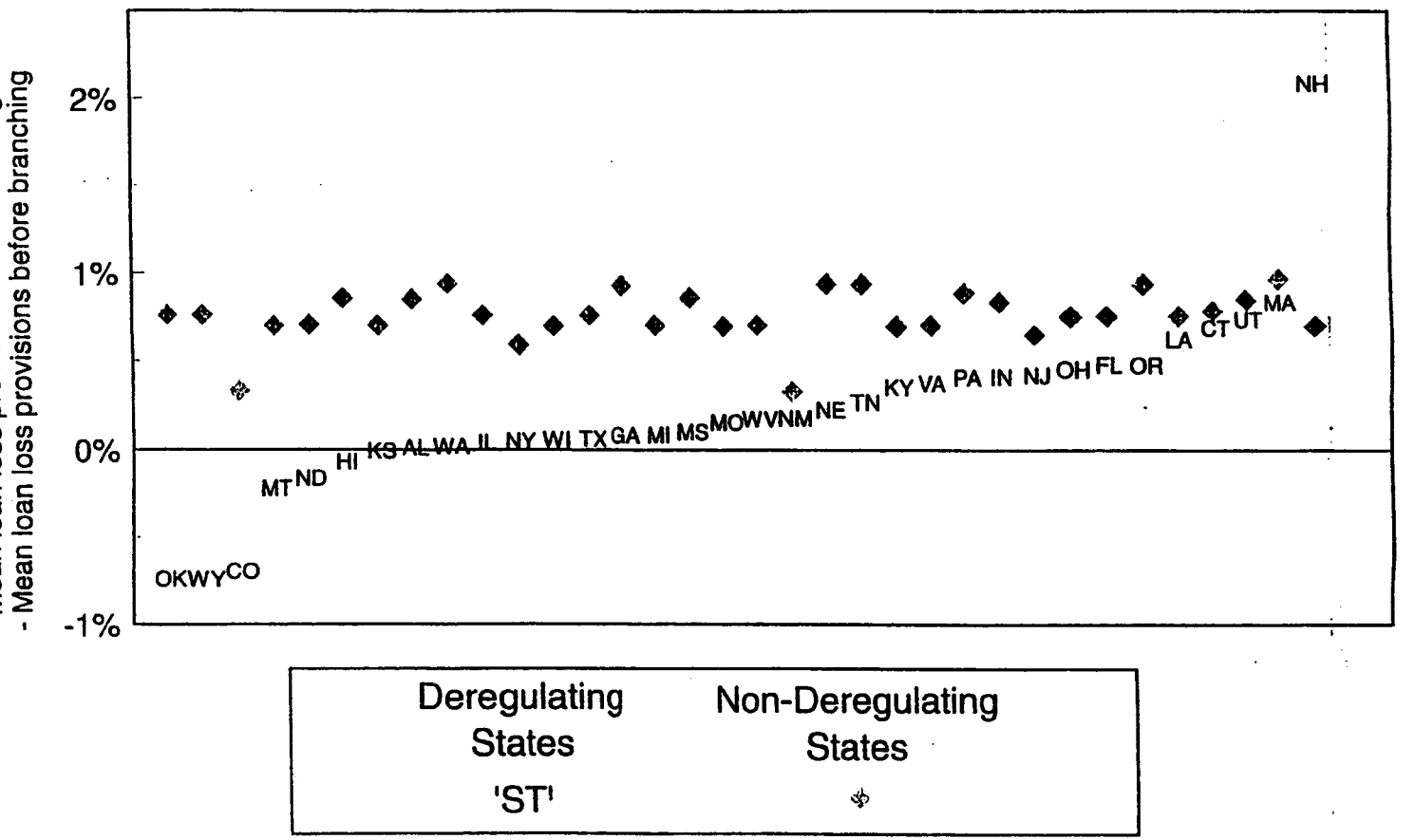

Figure 2

Change in Mean Loan Rate after Braching Deregulation

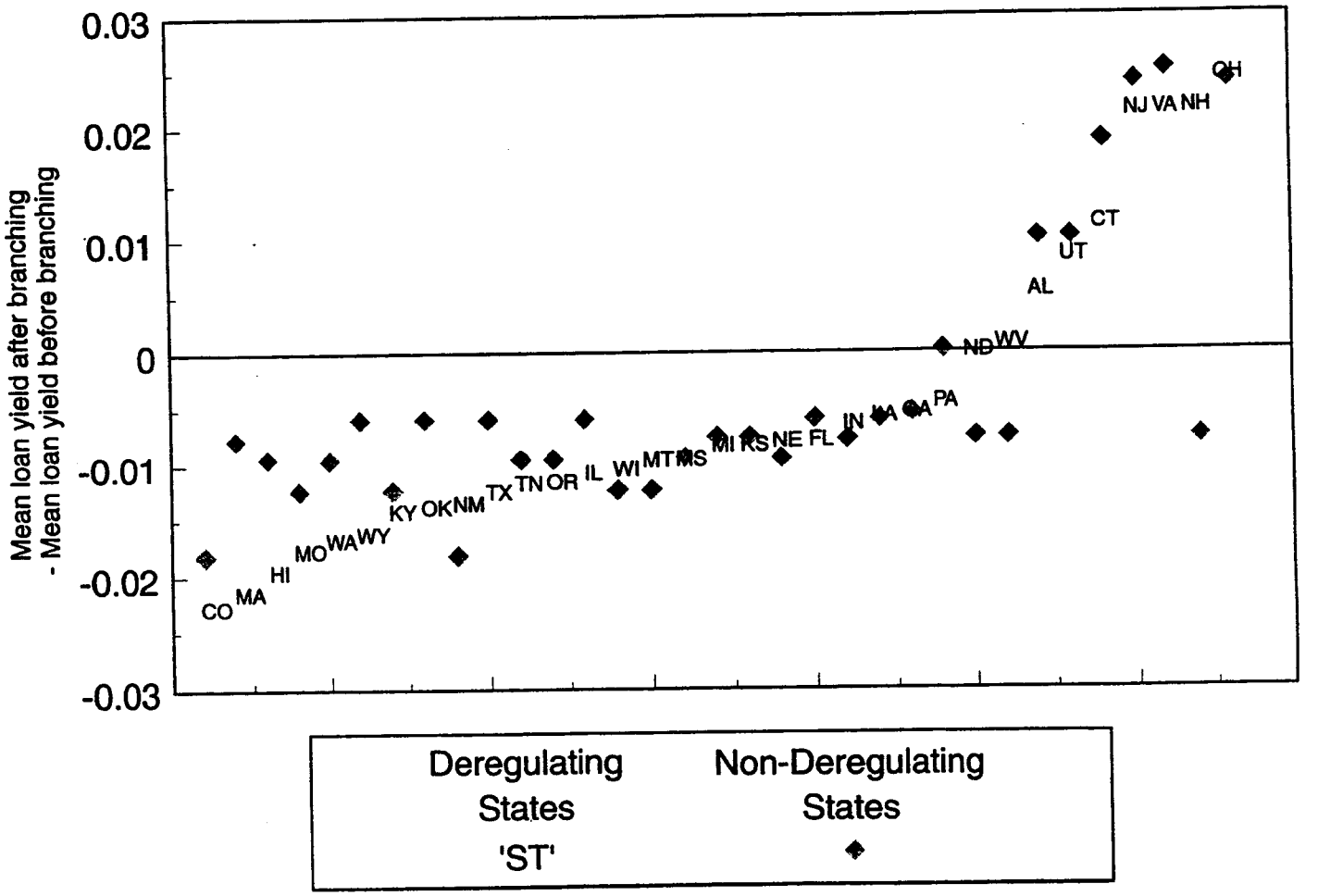

Table 6
Changes in Banking Market Structure Following Deregulation

	Log of State HHI (1)	Small Bank Share (2)	Acquisition Rate (3)
Intrastate Branching Indicator	0.0544 (2.61)*	-0.0090 (3.70)*	0.0016 (0.23)
Interstate Banking Indicator	-0.0445 (2.04)*	-0.0001 (0.02)	0.0161 (1.81)
Lagged Dependent Variable	0.7411 (8.23)*	1.0261 (17.72)*	-0.0651 (1.23)
Lagged Dependent Variable (Lagged 2 Periods)	0.0614 (0.68)	-0.1356 (2.59)*	-0.0595 (1.19)
State Personal Income Growth	-	-	0.1181 (1.87)
Personal Income Growth (Lagged 1 Period)	-	-	-0.0128 (0.18)
Personal Income Growth (Lagged 2 Periods)	-	-	-0.0091 (0.16)
Personal Income Growth (Lagged 3 Periods)	-	-	0.0587 (0.93)
Adjusted R-Squared	97.9%	99.2%	12.6%
Sample Period	1977-1992	1975-1992	1977-1992
N	706	802	706
Dependent Variable Mean	6.56	20.36%	2.2%

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. The small bank share equals the share of assets held by banks with assets under $100 million (in 1994 $s). 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

Regressions of Banking Company Growth on Ex-Ante Performance Indicators

Dependent Variable: Annual Asset Growth Rate	Continuous Performance Measure (1)	Discrete Performance Measure (2)
Specification based on Return on Assets		
Return on Assets	0.0022	0.0032
	(0.0012)	(0.0021)
Return on Assets * Post Deregulation Indicator	0.0057 *	0.0114 *
	(0.0023)	(0.0029)
Log of Total Assets	-0.1544 *	-0.1538 *
	(0.0050)	(0.0048)
Capital-Asset Ratio	0.1311 *	0.1329 *
	(0.0636)	(0.0572)
N	4,523	4,523
R-Squared	38.80%	38.95%
Specification based on Return on Equity		
Return on Equity	0.0024	0.0026
	(0.0013)	(0.0021)
Return on Equity * Post Deregulation Indicator	0.0075 *	0.0134 *
	(0.0023)	(0.0029)
Log of Total Assets	-0.1559 *	-0.1552 *
	(0.0051)	(0.0050)
Capital-Asset Ratio	0.1385 *	0.1470 *
	(0.0570)	(0.0561)
N	4,523	4,523
R-Squared	39.10%	39.12%
Specification based on Net Charge-Offs/Loans		
Net Charge-offs / Loans	-0.0010	-0.0018
	(0.0012)	(0.0022)
Net Charge-offs / Loans * Post Deregulation Indicator	-0.0054 *	-0.0128 *
	(0.0022)	(0.0030)
Log of Total Assets	-0.1636 *	-0.1630 *
	(0.0051)	(0.0050)
Capital-Asset Ratio	0.1172	0.1246 *
	(0.0623)	(0.0614)
N	3,997	3,997
R-Squared	40.56%	40.80%
Specification based on Loan Loss Provisions/Loans		
Loan Loss Provisions / Loans	-0.0010	-0.0005
	(0.0012)	(0.0020)
Loan Loss Provisions / Loans * Post Deregulation Indicator	-0.0023	-0.0094 *
	(0.0023)	(0.0029)
Log of Total Assets	-0.1520 *	-0.1519 *
	(0.0048)	(0.0048)
Capital-Asset Ratio	0.1162	0.1183 *
	(0.0598)	(0.0576)
N	4,560	4,560
R-Squared	38.26%	38.46%

Table 6 (Continued)
Regressions of Banking Company Growth on Ex-Ante Performance Indicators

Dependent Variable: Annual Asset Growth Rate	Continuous Performance Measure (1)	Discrete Performance Measure (2)
Specification based on Non-Performing/Loans		
Non-Performing Loan / Loans	-0.0011	-0.0063
	(0.0027)	(0.0048)
Non-Performing Loan / Loans	-0.0068 *	-0.0149 *
*** Post Deregulation Indicator**	(0.0033)	(0.0058)
Log of Total Assets	-0.1719 *	-0.1710 *
	(0.0124)	(0.0120)
Capital-Asset Ratio	0.0262	0.0364
	(0.1174)	(0.1198)
N	1,143	1,143
R-Squared	37.0%	37.5%

Notes: This table presents the results of the pooled model estimated with bank 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 variables in column 1 are continuous variables measured as of the beginning of the period; the variables have been scaled by subtracting off the mean value of the variable for all banks operating in the state and dividing by the standard deviation. The performance measures in column 2 are indicator variables, measured as of the beginning of the period, equal to 1 for banking companies with above-median values for that variable in the appropriate state and year. 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 .

Table 7
Changes in Bank Performance that Can be Attributed to Selection

	Pre-Deregulation		Post-Deregulation		
	Asset Weighted Average (1)	Weighted Average Based on Total Assets in t+5 (2)	Asset Weighted Average (3)	Weighted Average Based on Total Assets in t+5 (4)	Difference in Differences (5) [(4)-(3)] -[(2)-(1)]
Net income/assets	0.77%	0.80%	0.33%	0.65%	0.29%
Net income/capital	14.80%	11.67%	8.31%	9.25%	4.07%
Net charge-offs/loans	0.53%	0.47%	0.94%	0.67%	-0.21%
Loan loss provisions/loans	0.59%	0.49%	1.32%	0.90%	-0.32%
Non-performing loans/loans	3.12%	2.52%	3.40%	2.17%	-0.63%

Notes: The weighted averages for the pre-deregulation period are based on performance data observed 6 years prior to branching deregulation; the performance data for the weighted averages based on the size distribution in t+5 (column 2) are also observed 6 years prior to deregulation, but the weights are based on assets as one year prior to deregulation. Similarly, the weighted averages for the post-deregulation period are based on performance data observed one year prior to branching deregulation; the data for the weighted averages based on the size distribution in t+5 (column 4) are also observed one year prior to deregulation, but the weights are based on assets as of five years after deregulation.