Carleton Economics Department

Economics Comps Papers

 $Carleton \ College$ 

Year 2005

# The Impact of Bank Branching Deregulations on Economic Growth

Sanjiv Shrestha Carleton College,

This paper is posted at Digital Commons@Carleton College. http://digitalcommons.carleton.edu/ecp/4

## THE IMPACT OF BANK BRANCHING DEREGULATIONS

## ON ECONOMIC GROWTH

Sanjiv Shrestha Class of 2005 February 25, 2005 Economics Senior Integrative Exercise Faculty Advisor: Professor Tammy Feldman

I would like the thank Tammy Feldman for her constant guidance and support. I would also like to thank Parker Wheatley, Mark Kanazawa, and Nathan Grawe for helping me during various stages of this project, and to Kristin Partlo for helping me put together my data set.

#### Abstract

This paper analyzes the impact that intrastate and interstate bank branching reforms had on real economic growth. Aggregate state level data were collected from 1970 to 1997 and analyzed using a fixed effects model. The models focus on two possible channels – quantity and quality of the banking sector – through which the banking reforms may have contributed to growth. In order to specifically study these two channels, two sets of two-part regression models were used. The first part looks at the impact of the reforms on quality and quantity of banking, and the second part looks at the impact of these on economic growth. The findings suggest that the banking reforms made a positive and significant impact on state level growth by improving banking quality and not by increasing the quantity of banking. Economies that deregulated both intrastate and interstate branching restrictions prior to 1990 received a growth push of about .46 percentage points. This growth push decreased to about .13 percentage points for those that deregulated after 1990. Approximately four-fifths of the growth push came from intrastate branching reform and the rest came from interstate branching reforms. The results also suggest that the growth push due to the branching reforms lasted for at least five years.

## I. Introduction

Most states entered the 1970s with several restrictions on commercial banks. Banks faced restrictions on interest rates, both on the deposit and lending sides of their businesses. They were restricted largely to the classic financial intermediation – deposit taking and lending. Furthermore, banks were limited in the geographical scope of their operations. Individual states controlled the degree of branching allowed both within their borders and across borders. In the early 1970s, all the states completely prohibited crossborder bank branching, and most states severely restricted intrastate branching.<sup>1</sup>

In the later part of the 1970s, individual states started to ease their restrictions on bank branching. Some states allowed consolidation via mergers and acquisitions; some allowed bank-holding companies to expand. They also increasingly allowed out-of-state banking organizations to acquire in-state banks. This trend continued, and by the late 1980s almost all the states had completely relaxed their restrictions on both intrastate and interstate branching restrictions<sup>2</sup>. This process of branching deregulation culminated with the passage of the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (IBBEA) which effectively eliminated branching restrictions nationwide.<sup>3</sup> Over time, other restrictions have also been lifted. Interest rate ceilings on deposits were phased out in the early 1980s. Limitations to commercial banks' ability to engage in financial activities other than the mere borrowing and lending functions have also been almost

<sup>&</sup>lt;sup>1</sup> Although several methods were used to partially overcome these obstacles, geographic restrictions nevertheless made it difficult for banks to spread their operations across regions.

<sup>&</sup>lt;sup>2</sup> See Appendix for the years in which individual states deregulated.

<sup>&</sup>lt;sup>3</sup> IBBEA permitted states to opt out of interstate branching, but only Texas and Montana chose to do so. Most other states did protect their banks by forcing out-of-state entrants to buy existing branches rather than open new ones. (Strahan, 2002)

completely eliminated. With these changes in the regulatory policies, the banking system has become increasingly competitive and more consolidated.

Did these regulatory changes have any impact on the banking sector? Broadly speaking, when examining the changes in the banking sector one can look at the quality of banking byhow well banks allocate resources , and the quantity of banking by the level of investment they induce. If the regulatory changes of the 1970s and 1980s did improve the financial intermediation, then did this, in turn, help the real economy? In this project, I analyze the impact that bank branching deregulation had on the state level economic growth using annual state level data. Furthermore, by using two sets of two-part models, I study whether it was change in the quality of banking or the quantity of banking that affected economic growth.

The results of this study show that the banking reforms had a significant impact on banking quality and this gave a positive and significant growth push to the real economy. The impact of intrastate bank branching deregulation was more effective than that of interstate branching deregulation. However, the impact on the quantity of banking was not very significant. The findings in this study are consistent with the findings of other studies, which will be discussed in later sections.

#### II. The Finance-Growth Debate

The search for a set of institutional arrangements that drives economic development is perhaps the most important one in the study of economics. In particular, the role of fiscal policies and the structure of the financial sector on economic growth is one that has received tremendous attention in economic literature. The debate on the

relationship between finance and growth can be traced back to as early as the beginning of the twentieth century when Schumpeter wrote in 1912 "The Theory of Economic Development." In this book, he argued that well-functioning banks spur technological innovation by identifying and funding those entrepreneurs with the best chances of successfully implementing innovative products and production processes. According to Schumpeter, production requires credit to materialize, and hence, financial services are paramount in promoting economic growth. However, Joan Robinson [1952] argued that financial development simply follows economic growth. According to her view, economic development creates demand for particular types of financial arrangements and the financial system responds to those demands.

More recently, Edward Shaw examined the impact of government intervention on the development of the financial system in his "Financial Deepening in Economic Development" [1973]. The main policy implication that follows from his work is that government requirements on the banking system impede the process of financial development and, consequently reduce economic growth. His work suggests that the services provided by financial intermediaries have a positive effect on steady-state growth and that government intervention in the financial system has a negative effect on the growth rate.

A large number of empirical studies have been carried out to understand the relationship between finance and growth using cross-country data but the debate on the issue of causality is far from being resolved. Using data on 80 countries over the 1960-1989 period, King and Levine [1993] found that higher levels of financial development are positively associated with faster rates of economic growth, physical capital

accumulation, and economic efficiency improvements. They even contend that the predetermined component of financial development is a good predictor of long-run economic growth and that financial development both predicts the rate of physical capital accumulation and the rate of improvement in the efficiency with which economies allocate physical capital.

This study by King and Levine is one of the seminal econometric works in the finance-growth debate. However, it has been criticized by many for several reasons. In particular, Rajan and Zingales [1998] criticize King and Levine on the grounds that there are common omitted variables such as the propensity of households to save that could drive both growth and financial development. Also, "financial development – typically measured by the level of credit and the size of the stock market – may predict economic growth simply because financial markets anticipate future growth."<sup>4</sup> Thus, financial development may simply be a leading indicator rather than a causal factor. Moreover, as Arestis and Demetriades point out, King and Levine do not include country-specific institutional factors that are likely to influence the causal nature of the relationship between financial development and economic growth.<sup>5</sup> Even though King and Levine found out that, on average, finance leads growth for their sample countries, if one divides the countries on the basis of their institutional differences, then for the different groups the causal relationship can be different.<sup>6</sup>

<sup>&</sup>lt;sup>4</sup> Rajand and Zingales [1998], p559.

<sup>&</sup>lt;sup>5</sup> Arestis, Philip; Demetriades, Panicos. "Finance and Growth: Is Schumpeter 'Right'?" Department of Economics, Keele University

<sup>&</sup>lt;sup>6</sup>Arestis and Demetriades look at the "bank-based" and capital based systems. For "bank-based" systems, the link between finance and growth is likely to be very close and because of the roles banks have on providing long term loans to companies, it is more likely that finance leads growth. However, in the "capital-market-based" system, the link is weaker and that growth may lead finance.

More recently, a number of studies have sought to explain the finance-growth relationship by looking at the data on various states in the U.S.<sup>7</sup> The studies that use cross-country data are vulnerable to criticisms for not accounting for country-specific institutional differences. The relative homogeneity in the economic and legal infrastructure across states, however, makes the studies that use state level data more solid. There are several important cross-state and over-time variations in the regulatory status of different states. The use of a fixed effects model will help absorb both unobserved state differences as well as aggregate shocks that happen in various years. The fixed effects model, however, will leave sufficient variation in the regulatory variables, and hence enable one to estimate the effects that these regulatory changes had on state-level financial and real variables. For these reasons, using data at the state level is particularly advantageous from an empirical standpoint.

#### III. A Short History of U.S. Banking Regulation

The United States Constitution in 1788 prevented individual states from taxing interstate commerce and also removed their rights to generate revenue by issuing paper money. After this major source of financial flexibility was removed, states started to use their power over banks. To enter into the banking business, a bank had to first obtain a charter for which the states received fees. The states also often owned shares in these chartered banks, and to enhance the revenues obtained from these businesses, they had an interest in restricting competition among banks. This is how many of the restrictions on banking competition came into being. Since states did not receive any fees from banks incorporated in other states, they prohibited out-of-state banks from operating in their

<sup>&</sup>lt;sup>7</sup> These will be reviewed in Section IV

territories. Legislatures also often restricted intrastate expansion – states granted charters for a specific location and limited bank branches to a particular city or county. By adopting these restrictions, states created several local monopolies from which they could extract part of the rents through their share of ownership in these banks.

In addition to these restrictions, the passage of the Glass-Steagall Act in 1933 prevented commercial banks, investment banks, and insurance companies from entering into each other's territory and weakened competition in the banking sector. Such regulations naturally produce beneficiaries thatare reluctant to give up their protections and privileges. In this case, it was the smaller and weaker banks thatbenefited the most since these restrictions protected them from competition from larger and more efficient banking organizations. Benefits were concentrated on these smaller banks. However, the costs to consumers, because of a less efficient and lesscompetitive financial sector , were diffuse. Also, since these benefits were something that consumers never realized (as compared to situations where consumers have to give up the benefits that they were enjoying), there was little pressure from the customers for deregulation.

#### *Reasons for Deregulation*

Several changes that occurred in the 1970s reduced the value of the geographical restrictions, and the anti-branching laws started to disappear state by state. Kroszner and Strahan [1999] point out three major changes that helped drive deregulation. First of all, the advent of ATMs helped to erase the geographic ties between customers and banks. Second, checkable money market mutual funds and the Merrill Lynch Cash Management Account demonstrated that banking by mail and telephone provided a convenient

alternative to local banks. Also, technological innovation reduced transportation and communication costs, particularly since the 1970s, thereby lowering the costs for customers to use more distant banks. Thus, these innovations reduced the value of geographical restrictions to their traditional beneficiaries, and in turn, reduced their incentive to fight to maintain them. Furthermore, innovations in information processing began to diminish the value of knowledge that local banks had about the risks of borrowers in the community. These changes increased the potential profitability for large banks to enter what had been the niche for small bank activities. The incentive for large banks to increase their lobbying pressure to expand into these local and niche markets increased over time. Moreover, the increase in the failure rate of banks in the late 1970s, and the Savings and Loan crisis in the 1980s, heightened public awareness about the costs of restrictions.

These technological, economic, and legal shocks generated conditions that changed the balance favoring the anti branching forces. The marginal value of lobbying to repeal branching restrictions increased, while at the same time the relative value to the small banks of maintaining branching restrictions was declining. Hence, states started to deregulate in the 1970s, and this continued into the 1980s and the 1990s.

#### **IV.** Empirical Studies on the Finance-Growth Debate: the case of the U.S.

As pointed out in the earlier section, bank branching regulation operated on a state-by-state basis, and states deregulated at their own will in the 1970s and 1980s. These state-by state reforms culminated in the passage of the IBBEA in 1994 and effectively eliminated branching restrictions nationwide. Whatever the reason for the

deregulation, many studies have shown that the bank branching deregulation had a positive and significant impact on the banking industry. Stiroh and Strahan [2003] found that the market share of better banks (banks with above median ROE) increased after deregulation. Jayaratne and Strahan [1998] showed that loan losses decreased both in the short and the long run after statewide branching was permitted. They also showed that bank performance improved significantly and that the operating costs decreased. These benefits were passed on to the customers in the form of lower loan rates. Stiroh [1999] found that consolidation in the banking sector, as allowed by the regulatory reforms, had a significant impact on productivity growth as well. He contends that productivity growth and economies of scale were the driving forces that kept costs per asset low and allowed banks to experience strong performance in the 1990s.

The bank branching deregulations provide a perfect opportunity to study the relationship between finance and growth. If indeed Schumpeter and Shaw were right, then one can expect that the states that deregulated first saw higher rates of economic growth visà- vis the states that deregulated later. The paper by Jayaratne and Strahan [1996; hereafter JS] is one of the seminal works in the study of the impact of bank branching deregulation on state level economic growth. They produce their estimates from a fixed effects model of the form:

 $\mathbf{Y}_{t,i} / \mathbf{Y}_{t-1,i} = \alpha_t + \beta_i + \gamma \mathbf{D}_{t,i} + \varepsilon_{t,i}$ 

 $\begin{array}{ll} Y_{t,i} &= \mbox{real per capita income for state i for year t} \\ a_t, \beta_i &= \mbox{state-invariant and time-invariant fixed effects respectively,} \\ D_{t,i} &= \mbox{indicator variable set to one if branching is permitted in state i and time t} \\ &= \mbox{and zero otherwise.} \end{array}$ 

The coefficient  $\gamma$  is interpreted to be a permanent shift in per capita income growth due to branching; in other words, this model allows the study of long run impact of deregulation. The fixed effects specification controls both for state

specific differences in economic growth and for economy-wide shocks over time, helping to mitigate potential bias from factors omitted from cross-section or time series estimates.

JS estimate the change in economic growth rates before and after branch reform relative to a control group of states unaffected by reform using a generalized "difference– in–differences" method. Their results show that the coefficient on the deregulation indicator variable is positive and statistically significant at the 5 percent level. The point estimates are also economically large, indicating that growth rates increase by 0.51 to 1.19 percentage points following intrastate branching deregulation. Measurement problems associated with interstate commerce are likely to be more pronounced in smaller states. Smaller states are also more likely to depend on a limited number of industries, leading to greater susceptibility to industry-specific shocks and hence making their economy more volatile. In order to overcome such variations introduced by the more volatile economies, JS also estimate the model using Weighted Least Squares (WLS), with weights proportional to the size of the state economy. Even when the models are estimated using WLS, the results consistently show that the real economic growth accelerated significantlyfollowing the bank branching reform .

In their study, JS work hard to rule out other interpretations of the finding. They show that states did *not* deregulate in *anticipation* of future growth prospects. The typical state did not deregulate during the upswing of its business cycle. They do find that loan growth is positively correlated with the state economic growth rate, hence one can argue that states deregulated expecting there to be a surge in the demand for bank loans. However, despite controlling for this, the deregulation effect continues to be positive and significant. Thus, they conclude that "even if lending did increase following branch

reform, it does not account for the observed increase in growth following branch deregulation." The positive impact on growth was mostly because of channeling of savings into better projects; in other words, due to a better banking system.

JS do a very detailed analysis of the impact of the intrastate branching deregulation on state level economic growth, and, in fact, this paper has been a springboard for many subsequent studies in this area. However, JS use only the intrastate branching deregulation in their model and do not include the interstate branching deregulation. Secondly, even though they show that it was not the increase in loan growth, but improvement in the allocations of savings that affected economic growth, they do so only indirectly.

Other studies in this area that have taken different econometric paths have found results different from those of JS. Abrams, Clarke and Settle [1999; hereafter ABS] investigate the hypothesis that economic growth is affected by banking structure and fiscal policies. The writers use the data from 48 states for the period 1950-1980, to test the effect of the following on growth of state per capita income: (a) restrictions over branch banking; (b) restrictions over multi-bank holding companies (MBHC); (c) the depth of financial assets in a state; (d) the financial intermediary mix; (e) the size of the state government; and (f) the methods of financing state government. The use of the neoclassical growth model makes this study's approach very different from that of JS.<sup>8</sup> Since most of the variables in this model change very slowly over time, the paper groups the data into five-year time intervals. For example, the annual growth rate for each 5-year period is measured as  $(1/5)log((y_5)/y_0)$ .

<sup>&</sup>lt;sup>8</sup> This model was first used by Barro and Sala-i-Martin in 1992

The model includes a set of financial structure variables that measures the fraction of years that a state had some form of non-unit banking. One variable measures the fraction of every five year period that a state permitted banks to branch throughout the state; a second measures the fraction of the period that a state permitted some limited form of branch banking; and the third measures the fraction of each five-year period that a state permitted some form of multibank holding companies. The other key independent variable in their model is a predicted income growth variable, referred to as a "sectoral composition" variable. The sectoral composition variable is created by constructing a weighted average of predicted incomes from nine sectors and controls for broad national influences on a state's income growth rate.<sup>9</sup>

The results show that poorer states tend to grow more rapidly than richer states (convergence) after controlling for other factors. ABS also find that commercial financial depth is positive and statistically significant. However, the branching variables have no significant effect on economic growth suggesting that during the times of the branching restrictions, financial markets had adjusted to the regulations. The findings regarding branching restrictions suggest that a shift to nationwide branching is unlikely to produce any significant gains in the rate of economic growth, even though such a change may force some financial intermediaries to operate more efficiently. In this regard, the results do not support the Shaw hypothesis.

The ABS study used data from the period 1950-1980. Since many states deregulated only in the 1980s, it fails to capture the time period that can be considered the most important in the analysis of the impact of the bank branching reforms on

<sup>&</sup>lt;sup>9</sup> These nine sectors are: agriculture; mining; construction; manufacturing; transportation and public utilities; wholesale and retail trade; finance, insurance and real estate; services; and government and government enterprises.

economic growth. The 1980s saw major consolidation in both intrastate and interstate banking and by including this period, the writers could have reached stronger and more valid results. This couldnave been one of the reasons why the coefficients on the branching variables were not statistically significant. The period of their study does not provide enough observations and hence may have been plagued by statistical biases. JS were able to control for many unobserved state specific differences and for economywide shocks over time by using the fixed effects model. In the ABS study, however, differences across states had to be controlled explicitly and this may have made itmore difficult to answer for the unobserved variations.

Freeman [2001] uses yet another approach to analyze the impact of branching deregulation on economic growth. He treats state's growth rate as the individual firm's return and the national growth as the market return (as in a standard CAPM). The abnormal returns (due to the deregulation) are calculated relative to the state's year of branching reform for a window of 5 years preceding and 5 years following reform. He finds that, on average, economic growth for the deregulating states was below trend during the period prior to deregulation, and those states had accumulated a statistically significant deficit of 4% by the year that deregulation took effect. Even though the real income in these economies had recovered somewhat, they were still below trend years following deregulation.

In the JS study, the coefficient on the deregulation dummy is interpreted to be a permanent shift in the average growth of per capita income due to intrastate branching. In order to test whether the growth due to the deregulation is in fact long term, Freeman

analyzes the data by looking at various time frames. When the sample period is extended to include 6 years before and 6 years after the JS sample, he found that the coefficient of the branching indicator variable is only about four-fifths as large as the JS estimate. This decrease is consistent with his hypothesis that the period around deregulation is critical to the estimated effect of deregulation and since JS sample is mostly from the time period right after the bank branching reform (1972 – 1992), there might be an upward bias.

If the deregulation had a permanent effect on state economic growth, the exclusion of a window surrounding the year of deregulation should have little effect on the estimate of its impact. When Freeman excluded the three years period prior and three years period after the deregulation year, he found that the coefficient of the branching indicator variable decreased to about half that of the JS estimate. Finally, when he increased the exclusion to five year window the coefficient decreased to about one-third. Freeman argues that deregulation is itself endogenous to state economic conditions, and that this endogeneity imparted an upward bias to the JS estimate of the effect of deregulation on state economic growth. Thus, even though his analysis shows that banking deregulation has a positive impact on the economic growth it is not likely that the growth effects are long term in nature or as large as what JS estimated.

These are only three of several studies that have analyzed the impact of the bank branching deregulation on economic growth. Economists have used a wide range of models, and often times the results of one study contradict with those of other studies. For example, whereas JS found that intrastate branching had a positive and significant impact on economic growth, Freeman found that this effect was only temporary and was

not as large as JS claimed it to be, and ABS's results show that the branching variable was insignificant. Thus, despite the many studies, much is yet to be understood about the impact of the banking regulations on economic growth.

### V. Theoretical Framework and Model

Competition is one of the most fundamental concepts in economics. As individual firms compete for profits, there are clear market outcomes: strong performers thrive, while weak performers shrink or exit the market. This transfer of market share from poor performers to the more successful ones is a critical part of the competitive process, but this is not always the reality. Especially when regulations and other barriers to entry are introduced to protect inefficient firms and/or limit entry and exit, markets may be prevented from achieving their competitive equilibriums. In any case, the competitive outcome may not always be desirable as the firms that go out of business may cause a painful instability in the market and this is particularly true in the banking industry.

Several empirical works have shown that bank branching deregulations improved the competitive status in the banking industry, which in turn led to increased efficiency and reduced costs ultimately benefiting the consumers. However, it is also true that the same time period when the most of the states deregulated is associated with great instability in the banking sector. After decades of relative stability, market, technological, and regulatory shocks in the 1980s led to the most severe banking crisis since the Great Depression.

"These shocks – increased competition and disintermediation, financial innovation and technological advances, and widespread deregulation of deposit rates, and geographic restrictions – contributed to rapid change in the banking sector through a wave of bank failures and mergers. From 1980 to 1994, for

example, more than 1600 FDIC-insured commercial banks closed or required FDIC assistance and the number of FDIC-insured banking organizations fell from 14,886 in 1984 to 8,895 in 1997."<sup>10</sup>

Shaw [1973] advocated financial liberalization claiming that any regulatory restrictions in the financial sector repressed economic growth. However, there is no dearth of theories supporting financial repression.<sup>11</sup> Thus, the impact of financial policies on economic stability and growth is far from being fully understood, and any theory should ultimately be supported by empirical studies.

The hypothesis in this study is that lifting of financial restrictions will ultimately lead to accelerated economic growth, and I follow Jayaratne and Strahan's approach of using annual state level data. If indeed Shaw is correct in pointing out that any government restrictions on the financial sector will repress economic growth, we should see an increase in the economic growth rate of states following the branching deregulations – both intrastate and interstate regulations. Improvements in the financial markets can matter either by affecting the volume of savings available to investors or by increasing the productivity of investments made possible by the banks. In essence, these two represent the "quantity" and "quality" of the banking sector.

JS pooled cross-section and time series state level annual data for the period 1972 to 1992 in order to test the growth effects of regulatory reforms concerning commercial banking. This paper includes a wider time frame and has a different approach. First of all, the impacts of both interstate and intrastate branching reforms on growth are considered

<sup>&</sup>lt;sup>10</sup> Stiroh, 1999

<sup>&</sup>lt;sup>11</sup> Especially in the wake of the 1997 financial crisis in Asia, economists such as Krugman and Stiglitz have argued for some degree of financial repression, or at least conditional liberalization.

in this study<sup>12</sup>. Second, and more importantly, the purpose of this study is to look atthe channels through which these regulatory changes affected economic growth.

Margaret Clarke used a two-stage model to determine whether the banking deregulations promote economic growth through their influence on the size of the banking market. On the first stage of regressions a proxy for the size of banking markets is projected onto a set of regulation indicator variables. In the second stage, economic growth is projected onto a set of regressors: the predicted value of banking market size and the residual from the first-stage regression along with other control variables. Using the results from the first stage as instrumental variables in the second stage helped her address the issue of simultaneity bias.

This study also employ a similar two part model to study the channels through which the regulatory changes affected economic growth. Banking regulations, by restricting banks from operating freely, can affect the quantity as well as the quality of banking. Several economists have argued that the local monopolies that resulted because of the banking restrictions were the cause of large inefficiency in the banking industry. Thus, one would expect to see improvements in both quality as well as quantity of banking when such regulations were repealed. With a more efficient and more widely available banking system, one would also expect a positive contribution to the real economy. If the regulatory changes did have an impact on the real economy, then how much of the improvement is due to an increase in the quantity of loans available for entrepreneurs to borrow and how much of it can be contributed to an improvement in the

<sup>&</sup>lt;sup>12</sup> Intrastate deregulation was not a single process for most states. Most states first allowed bank branching via mergers and acquisitions and allowed banks to freely open de novo branches only later on. "Intrastate branching" is used to mean branching via mergers and acquisition in this study. Except for a few states that lifted restrictions on M&A and de novo branching at the same time, most states allowed M&A branching first.

quality of the banking sector? It is in this sense that this study, as an attempt to parse the regulatory changes' impact on the real economy, differs from the others done in this field.

In order to analyze these changes, two sets of two-part regression models were run. The first model focuses on the impact of the bank branching deregulation on economic growth through changes in the quality of lending. The second model looks at the same but through changes in the amount of loans made available by commercial banks.

This study uses data from 1970 until 1997. The IBBEA that was passed in 1994 took full effect in 1997. "Under this act, bank holding companies are permitted to acquire banks in any state, merge banks across state lines and operate the merged banks as branches."<sup>13</sup> This substantial change in the federal law governing banking operations justifies the end of this state-by state effect study in 1997.<sup>14</sup> In this study, data were collected for 49 states and the District of Columbia over the 28 years period giving a total of 1400 observations for all the variables.<sup>15</sup>

By using the state as the relevant unit, the resulting panel data set is balanced because states do not enter or exit the sample. Thus, there is no need to worry about (or attempt to correct for) survivorship biases that can plague attempts to draw inferences from bank-level or firm-level data.<sup>16</sup> The majority of the empirical works in the financegrowth debate have focused on cross-country data and these are criticized for not fully controlling for the institutional variations across countries. The use of state level data will

<sup>14</sup> Other important changes such as the Gramm Leach Bliley Act were also occurring soon after this time. Hence, including more years will complicate the study.

<sup>&</sup>lt;sup>13</sup> Garrett et al. "A Spatial Analysis of State Banking Regulation." 2004

<sup>&</sup>lt;sup>15</sup> Delaware is not included in the study because it passed a law in 1982 that provided incentives for credit card banks to operate there because of which the share of the state's economy attributed to the banking industry was unduly large.

<sup>&</sup>lt;sup>16</sup> Following JS, I intend to use state level data. This argument presented by JS to justify using state level data over bank level data is appropriate for this study as well.

alleviate this problem because of the relative homogeneity in the institutional setup across states.

Since states deregulated at different times, there are significant cross sectional and time series variations in states' restrictions on bank branching. Of the 50 regions considered here, 11 states had already relaxed the intrastate branching deregulation by 1970. Between 1970 and 1980 another four states allowed intrastate bank branching and in the following decade 21 more states deregulated.

Maine was the first to allow banks from other states to operate in the state by relaxing its interstate branching restrictions in 1978. Between 1980 and 1990, 43 states deregulated and by 1997, Hawaii was the only state that did not allow out of state banks. It is also not necessarily the case the states relaxed the intrastate bank branching restrictions before allowing out of state banks to open branches. Of the regions considered in this study, 21 states passed interstate banking deregulation before allowing the in-state banks to freely open multiple branches. A full listing of the years when states passed interstate and intrastate deregulation is given in the Appendix.

Such variations allow the application of powerful econometric techniques on panel data sets. The use of a fixed effects model in this study will make it less vulnerable to problems that arise due to omitted variables. This method will also help absorb the unobserved state specific component of long-run economic growth and the economywide aggregate shocks to growth in any given year. Thus, the differences between states or shocks common to all states need not be controlled specifically. Estimates of the coefficients are driven by changes in variables after a state alters its regulations. Persistent differences across states do not affect the results. Instead, the model looks at

how a state's banking structure changes after it deregulates, and on how its growth performance changes relative to its level before deregulation.

The two "channels" through which the regulatory changes may have affected economic growth are described in turn below.

#### *i) Quality of Lending*

The quality or efficiency of a bank's lending activities is best understood by analyzing the productivity of the bank borrowers. An efficient banking system would make its loans available to those who can best utilize these resources. However, such data is virtually impossible to collect. First of all, it is hard to find out where exactly the firms used the money that they borrowed, and secondly, how would one calculate the increase in productivity of these businesses that is due to the bank loans?

Net loan and lease charge-offs, which represents gross loans and lease charge-offs minus the loan and lease recoveries, can proxy how well banks are monitoring their loans. The gross loan and lease charge-offs represent the actual charge-offs against the allowance for loan and lease losses. Data on charge-offs for commercial banks are available through the Federal Deposit Insurance Corporation (FDIC) on a state by state basis.<sup>17</sup> Call Reports are filed by all FDIC insured commercial banks and the state level net charge-offs are calculated by summing over all banks in each state. Data collected from FDIC were then divided by the total loans given out by the commercial banks and this ratio was used as a proxy for the "quality of lending" in this model. Data on total loans issued by commercial banks are also collected from the Call Reports and summed up to give state level data.

<sup>&</sup>lt;sup>17</sup> http://www2.fdic.gov/hsob

The first part of this model was estimated by regressing this proxy on a set of dummy variables that represent the years in which individual states relaxed their intrastate and interstate branching restrictions. The values for the dummies are one for the years in which the states allowed bank branching and zero otherwise. A set of year dummies and another set of state dummies were used in order to control for state-level and over-time variations in a fixed effects model.

#### First Stage

 $LL_{s,t} = a + \alpha_t + \beta_s + \gamma_1 INTRA_{s,t} + \gamma_2 INTER_{s,t} + \varepsilon_{t,s}$  s denotes state; t denotes the year.

LL	= Net charge-o	offs as a percer	stage of total	commercial	bank loans

- a = constant
- $\alpha_t$  = year dummies
- $\beta_s$  = state dummies
- INTRA = dummy variable for intrastate branching deregulation (1 for years when states were deregulated, 0 otherwise)
- INTER = dummy variable for interstate branching deregulation (1 for years when states were deregulated, 0 otherwise)
- $\varepsilon$  = residual (factors other than INTRA and INTER that impact LL)

The second stage attempts to figure out how much impact the changes in the quality of banking, which is attributable to the regulatory changes, had on the state level real economic growth. Per capita personal income were collected from the bureau of economic analysis and converted to 1984 dollars using the Consumer Price Index (CPI).<sup>18</sup> These figures were used as a proxy to calculate the real growth at the state level for the sample time period. In the second stage, this variable was regressed on a set of independent variables including the predicted (LL\_pred) and the residual (LL\_res) values from the first stage of regression.

<sup>&</sup>lt;sup>18</sup> <u>http://www.bea.doc.gov/bea/regional/spi/</u>

#### Second Stage

Growth  $_{s,t} = a + \beta_s + \gamma LL\_pred_{s,t} + \lambda LL\_res_{s,t} + \varepsilon_{s,t}$ 

Growth	state growth rate (proxied by per capita personal income)
$\alpha_t$	measures the common, economy-wide shock to growth at time t,
$\beta_s$	measures the state-specific component of economic growth, and
γ	measures the increase in economic growth stemming from changes
	in LL due to the regulatory reforms

To determine whether a link exists between deregulation, "loan loss" and economic growth, LL\_pred from the first part was used as an instrumental variable in the second part of the model If financial intermediation did improve following deregulation then one should expect loan losses to decrease. Thus, one would expect both  $\gamma_1$  and  $\gamma_2$  in the first stage of regression to be negative and statistically significant. In addition, if this improvement in banking quality had a positive impact on economic growth then one should also expect a negative coefficient on "LL\_pred" in the second stage. The use of the predicted values from the first stage will make the study concentrate on the impact the changes in "loan loss" on the economy that is only contributable to the regulatory changes.

The residual in the first stage captures the effect of all the determinants of "LL" other than the regulatory indicator variables. If the change in "LL," as defined by deregulation is what matters, then in the second stage of regression, only  $\gamma$  should be statistically significant. The "LL\_res" in the second stage will allow one to see if the changes in the state growth rate through decrease in LL are because of the bank branching deregulation or because of other variables that affected banking quality.

Data for this study spans three decades – 1970s, 80s and 90s. Since, states deregulated at different years, it could be the case that states that deregulated later on did

not benefit from the regulatory changes quite as much as the states that deregulated earlier. In order to study how the timing of deregulation affected growth, the following model was used.

Growth<sub>s,t</sub> = a +  $\beta_s$  +  $\gamma$ LL\_pred<sub>s,t</sub> +  $\lambda$ LL\_res<sub>s,t</sub> +  $\gamma_1$ (LL\_pred<sub>s,t</sub> - LL\_pred<sub>s,1990</sub>)D90 +  $\lambda_1$ (LL\_res<sub>s,t</sub> - LL\_res<sub>s,1990</sub>)D90 +  $\epsilon_{s,t}$ Where, LL\_pred<sub>s,1985</sub> is the LL\_pred (from first regression) for state s in 1985 D90 = 1 for years 1991 and later, and 0 otherwise The coefficients we are interested in are:  $\gamma$  and  $\lambda$  for 1970 to 1990

 $(\gamma + \gamma_1)$  and  $(\lambda + \lambda_1)$  for 1990 to 1997

TABLE 1: Summar	y of the expected s	signs on the coefficients:

	Dependent Variable	Coefficients	Expected sign
First Stage	LL	$\gamma_1$	-
	(as a % of State Personal Income)	γ2	-
Second Stage	State Personal Income Growth	γ	-
		$\gamma_1$	+
		λ, λ <sub>1</sub>	?

## *ii)* Availability of Loans (Quantity)

If Shaw's hypothesis is right, then the relaxation of regulations should increase the amount of financial resources that is available for the public to borrow. If the changes in the regulatory environment make it easier for commercial banks to operate and provide their services to the public then we should expect an increase in the number of these commercial banks or the sizes of the existing banks. Thus, one would expect an increase in the quantity of commercial banking if indeed these regulatory changes had a positive impact on commercial banks. "Commercial and Industrial loans" on a state by state are available through the FDIC.<sup>19</sup> These figures were divided by state personal income (available through the bureau of economic analysis) in order to control for the increasing sizes of the state level economies in the sample period. This transformed variable was then regressed on a set of dummy variables as shown in the equation below.

A second proxy – total assets held by commercial banks as a proportion of the state personal income – was also used in order to measure the impact of the branching reforms on economic growth via quantity of banking. Total assets reported by the FDIC on a state level basis is calculated as the sum of all assets owned by institution in the given state including cash, loans, securities, bank premises and other assets as of the last Call Report filed by the institution. This total does not include off-balance-sheet accounts.

#### First Stage

Following Shaw's hypothesis, the quantity of loan available should increase after government restrictions are removed, and hence, one would expect positive coefficients on the regulation dummies.

<sup>&</sup>lt;sup>19</sup> <u>http://www2.fdic.gov/hsob</u> The figures represent loans for commercial and industrial purposes to sole proprietorships, partnerships, corporations and other business enterprises. These loans may take the form of direct or purchased loans and include the reporting bank's own acceptances that it holds in its portfolio. It also included loans to individuals for commercial, industrial or professional purposes.

To determine whether a linkage exists between deregulation, "quantity of banking," and economic growth, the predicted values "Q\_pred" from the first stage regression were used as a regressor in the second stage.

#### Second Stage

To study the impact of timing of deregulation on economic growth through changes in the quantity of banking, the following model was used. The dependent variable here is again the real rate of per capita personal income growth.

$$Growth_{s,t} = a + \beta_s + \gamma Q\_pred_{s,t} + \lambda Q\_res_{s,t} + \gamma_1(Q\_pred_{s,t} - Q\_pred_{s,1990})D90 + \lambda_1(Q\_res_{s,t} - Q\_res_{s,1990})D90 + \epsilon_{s,t}$$

Q\_pred<sub>s,1990</sub> is the Q\_pred (from first regression) for state s in 1990 D90 = 1 for years 1991 and later = 0 otherwise

The coefficients of interest here are  $\gamma$  and  $\lambda$  for the case prior to 1990 and  $(\gamma + \gamma_1)$  and  $(\lambda + \lambda_1)$  for the case after 1990.

	Dependent Variable	Coefficients	Expected sign
First Stage	Q	$\gamma_1$	+
	(as a % of State Personal Income)	$\gamma_2$	+
Second Stage	Per Capita Personal Income Growth	γ	+
		γ1	-
		λ, λ <sub>1</sub>	?

TABLE 2: Summar	y of the exp	pected signs	on the	coefficients:

Together, the two sets of regressions will allow one to study the impact of bank

branching deregulation through changes in both the quantity of loans available for investment and the efficiency of these allocations. Figure 1 diagrammatically summarizes the models used in this study.



### VI. Empirical Results and Analysis

The first part of each regression model measures the impact of bank branching deregulations on a key variable. In the first analysis, the initial part models the quality of banking, proxied by the net charge-offs as a fraction of the total banks loans. The second analysis models the quantity of banking, proxied by commercial and industrial loans issued by commercial banks as a fraction of state personal income. The predicted values from this stage were then used in the second parts of the regressions. The null hypotheses are that the "quantity" and "quality" variables do not have significant impact on per capita personal income growth.

#### Growth through Changes in the Quality of Lending:

Table 3a below shows the values of the coefficients estimated by the first stage of regression modeling the quality of commercial bank lending.

TABLE 3a:	Quality	y of Ba	anking A	Activity
			_	

		Coefficients	t-statistic	Sig	
	Unsta	Unstandardized Standardized		51g.	
Independent Variable	Beta	Std. Error	Beta		
INTRA	004	.001	300	-7.276	.000*
INTER	001	.001	090	-1.905	.057*
R-squared	0.694				

Dependent Variable: Net charge-offs per total loan

\* significant at 5% significance level

**Model:**  $LL_{s,t} = \alpha_t + \beta_s + \gamma_1 INTRA_{s,t} + \gamma_2 INTER_{s,t} + \varepsilon_{t,s}$ . Since the year and state dummies were used in order to control for the unobserved variations, coefficients on them are not reported here. **Note:** Using the F-test, the hypothesis that the constant term is equal to 0 could not be rejected. After setting the constant term equal to zero, the R-square value increased to 0.694 from 0.423. The coefficients shown in the table are for the model without the constant term.

#### $LL_{s,t} = \alpha_t + \beta_s - .004INTRA_{s,t} - .001INTER_{s,t} + \varepsilon_{t,s}$

The coefficients on the two regulatory dummy variables, INTRA and INTER are both significant at the 5% level. Therefore, the null hypothesis that deregulation did not have an impact on the quality or efficiency of banking can be rejected. The coefficients on the two dummy variables of interest are negative, suggesting that bank branching deregulation had a significant contribution in decreasing the bad loans that the banks had to write off. The predicted and the residual values from the first part of this regression were then used as independent variables in the second part of the analysis. The estimates from this regression are presented in table 3b(i) below:

		Coefficients	t statistic	Sig				
	Unsta	indardized	Standardized	t-statistic	Sig.			
Independent Variable	Beta	Std. Error	Beta					
a	.025	.006		4.179	.000*			
LL_pred	935	.236	129	-3.963	.000*			
LL_res	262	.167	042	-1.568	.117			
R-square .023								
Dependent Variable: State per capita personal income growth								
*Coefficients significant at 5% significance level.								
<b>Model</b> : Growth <sub>s,t</sub> = $a + a + a + b = a + b$	<b>Model</b> : Growth <sub>s,t</sub> = $a + \beta_s + \gamma LL_pred_{s,t} + \lambda LL_res_{s,t} + \varepsilon_{s,t}$							

TABLE 3b(i): Per Capita Personal Income Growth<sup>20</sup>

The coefficient on the LL\_pred variable is negative suggesting a negative correlation between this and per capita personal income growth, the dependent variable. For every point decrease in this explanatory variable, the per capita personal income increases by .935 points. From the first part of the model, it can be inferred that the two types of bank branching deregulations caused for the loan loss as a proportion of total commercial bank loans to decrease by about .005 points (.004 + .001). This translates into .47 percentage point or point increase in the per capita personal income growth. The

<sup>&</sup>lt;sup>20</sup> The standard errors presented in this study were not checked for heteroscedasticity. Since all the models used in this paper have a lot of dummy variables (49 state dummies and 27 year dummies in most cases), the statistic we are interested in testing for heteroscedasticity (nR<sup>2</sup>) will have a very high degrees of freedom (which is equal to the number of regressors). In chi-squared distribution, the mean is equal to the degrees of freedom and hence, it takes extreme cases of heteroscedasticity to be detected using the White's general heteroscedasticity test. Even if we assume the variables to be plagued by heteroscedasticity, it is very hard to remedy for it. Some of the predicted values from the first part of the model are negative and even zero. Thus, we cannot transform the data by taking the logarithm; nor can we divide the data by the explanatory variable or their square root. This raises the issue of how to correct for this problem in panel data, especially those with a large number of dummy variables. Thus, the estimates presented in this paper were not checked or corrected for heteroscedasticity. This may have made the estimates less precise. However, they were still significant and they should be unbiased.

estimates also show that about four-fifths of this observed growth came from intrastate branching reform and the remaining one-fifth came from interstate branching reform. A bank operating in any particular state is already familiar with the legislation and economy of that state. However, operating in a different state may prove to be relatively costlier and more challenging, at least initially. Thus, it does make sense that the intrastate deregulation had a more pronounced impact on economic growth compared to the interstate deregulation.

State level growth is influenced by the broader national business cycle. In order to control for this factor, the same regression was run with an additional explanatory variable – the U.S. real GDP growth, lagged by one year. Since the national GDP growth is the average of the state level GDP growth, by definition there will be endogeniety problems if the GDP growth is not lagged. By lagging this variable by one year, we can use this as a possible predictor for the state level growth. The estimates from the new regression with this additional control variable is presented in table 3b(ii) below:

		Coefficients	t statistic	Sig			
	Unsta	ndardized	Standardized	- t-statistic	Sig.		
Independent Variable	Beta	Std. Error	Beta				
а	.019	.006		3.190	.001*		
LL_pred	829	.231	114	-3.580	.000*		
LL_res	262	.163	042	-1.601	.110		
GDPgrowth	.238	.031	.204	7.727	.000*		
R-square .065							
Dependent Variable: State personal income growth							
<b>Model</b> : Growth <sub>s,t</sub> = $a + \beta_s + \gamma LL_{pred_{s,t}} + \lambda LL_{res_{s,t}} + \delta GDPgrowth_{t-1} + \varepsilon_{s,t}$							

|--|

By introducing this lagged variable, the coefficients decreased by a small amount. However, this explanatory variable is still highly significant. According to this model, the regulatory changes' contribution through an improvement in the banking quality was to increase the per capita personal income by about .41 percentage points (.820\*.0005). The positive coefficient on the lagged real GDP growth suggests that, on average, this leads state level growth to a certain degree.

As Jayaratne and Strahan (1998) pointed out, most of the decrease in costs due to improvement in the banking sector appears to have been passed along to bank borrowers in the form of lower loan rates. Thus, the bank customers were left better-off after deregulation. Aside from this direct contribution to the personal income, there may be several other ways through which improvement in the banking sector contributed to the economic growth. As several studies have shown, increased competition in the banking sector was one of the outcomes of these deregulations. This probably allowed better performing banks to grow relatively faster. Furthermore, as seen from the first part of this model, the net charge-offs decreased following deregulation. Thus, banks were better able to allocate the economic resources. Following the branching reforms, banks had access to a wider market, and hence had more options to choose the businesses they would lend to. Without the protection of local monopolies, banks now had to come with their own means for survival – to improve the way they run their businesses. All these changes brought about by the bank branching deregulation made a positive and significant impact on the state economy.

In order to investigate whether the states that deregulated at different years over the sample period enjoyed different degrees of growth, a new dummy variable (D90) was

introduced to the model. By using this dummy variable (which gets a value of 1 for years after 1990 and 0 otherwise) as shown in Table 3b(iii), we are able to see if the relationship between "LL\_pred" and per capita personal income growth was different for those states that deregulated much later compared to other states. The results in the table below show that thestates that relaxed their bank branching restrictions before 1990 experienced a greater amount of economic growth.

		Coefficients			
	Unstar	ndardized	Standardized	t-statistic	Sig.
Independent Variable	Beta	Std. Error	Beta		
а	.020	.006		3.353	.001*
LL_pred	910	.234	126	-3.890	.000*
LL_res	295	.170	048	-1.731	.084
(LL_pred <sub>s,t</sub> – LL_pred <sub>s,1990</sub> )D90	.658	.314	.056	2.197	.036*
$(LL\_res_{s,t} - LL\_res_{s,1990})D90$	.150	.287	.016	.550	.583
GDPgrowth	.239	.031	.205	7.776	.000*
R-square	.068				

#### TABLE 3b(iii): Timing of Deregulation

Dependent Variable: Per capita personal income growth

\* Coefficients significant at 5%

**Model:**  $a + \beta_s + \gamma LL\_pred_{s,t} + \lambda LL\_res_{s,t} + \gamma_1(LL\_pred_{s,t} - LL\_pred_{s,1990})D90$ 

+  $\lambda_1(LL\_res_{s,t} - LL\_res_{s,1990})D90 + \epsilon_{s,t}$ 

D90 = 1 for t > 1990, 0 otherwise

**Note:** The time fixed effect dummies are not included in this model because of the introduction of the D90 dummy variable. In order to compare the coefficient estimates from this model with estimates presented in Tables 3b(i) and 3b(ii) above, the time fixed effects were removed from the earlier regressions as well. This explains the very small values of R-square.

During the period 1970 – 1990, states that relaxed both forms of branching

restrictions experienced a boost in their per capita personal income growth by about .46

percentage points (= .910\*.005). This figure decreased to sharply to about .13 percentage

points (=(.910 - .658)\*.005) for those states that deregulated after 1990. In other words,

the benefits of deregulation that came about through improvements in banking quality was more than three times greater for those state that deregulated earlier. During 1970 to 1989, the average state personal income growth was 2.99% and during 1990 to 1997, it was about 2.31% for the sample considered in this study. Thus, on average, the regulatory reforms accelerated state personal income growth by about 15.4% prior to 1990 and by about 5.6% after 1990.

States that deregulated later might have already enjoyed some positive externalities from those states that deregulated earlier. The economy of one state, after all, does not work in complete isolation from other states. The changes in the banking sector of the early deregulating states may have induced some similar changes in the states that still imposed branching restrictions. If indeed this positive spillover occurred, then these states would have already enjoyed part of the benefits of deregulation before they deregulated themselves. This could be one of the reasons why the states that deregulated later did not see as much gain from their own deregulations per se.

Besides this, convergence – the theory that poorer economies grow faster to "catch up" with richer economies – can be another possible explanation. States that deregulated earlier enjoyed higher growth rates creating differences in the growth levels between them vis-à-vis those that deregulated later. Thus, part of the faster economic growth for those states that deregulated later can be explained by convergence, which is not captured by the regulatory reforms considered in this study.<sup>21</sup>

The coefficients on the LL\_res variable were not significant at 5% level in any of the regressions so far. This shows that the residual values from the first part of the analysis do not have as much explanatory power as the predicted values. Thus, much of

<sup>&</sup>lt;sup>21</sup> A better way to attest for this explanation is to check for convergence by using the initial growth levels.

the changes in banking quality came from the regulatory reforms. Even if these coefficients were significant, caution must be taken while analyzing their implications.<sup>22</sup> In this study it was implicitly assumed that there is no endogeneity between growth and deregulation. However, the residuals from the first stage capture the effects of all factors other than deregulation. These include technological changes, the Fed's policies, and even state economic growth. Thus, the factors that contribute to the residual terms may be endogenous to growth. In such a case we cannot interpret the coefficients on the residual terms in the same manner as we interpreted the coefficients on the predicted values. However, since the coefficients are not as significant, the results suggest that most of the impact on per capita personal income growth was because of the banking reforms.

The model presented in JS as well as in this study so far measure the long term impact of the branching reforms on economic growth. However, it is natural to question how long the impact of the reforms really lasted. In order to see the impact of these reforms on the quality of banking two indicator dummy variables, Intra5 and Inter5, were introduced. Intra5 is set to one after five years of intrastate deregulation and Inter5 set to one after five years of interstate deregulation. If the growth effects were not permanent, then these new dummies must have a positive and significant coefficient (to counteract the effect of INTER and INTRA on the dependent variable). The long term effect of the branching reforms is given by the sum of the coefficients. Table 3b(iv) presents the coefficients on these variables:

<sup>&</sup>lt;sup>22</sup> If we were able to correct for heteroscedasticity, it is possible that these estimates may have become more significant.

	Coefficients				
	Unstandardized		Standardized	t-statistic	Sig.
Independent Variable	Beta	Std. Error	Beta		
INTRA	004	.001	286	-6.687	.000*
INTER	001	.001	087	-1.841	.066
Intra5	001	.001	050	-1.305	.192
Inter5	.000	.001	006	166	.868
R-square	.695				

TABLE 3b (iv): The long term effect of branching reforms

**Dependent Variable**: LLperTL

**Model**:  $LL_{s,t} = \alpha_t + \beta_s + \gamma_1 INTRA_{s,t} + \gamma_2 INTER_{s,t} + \gamma_3 Intra5_{s,t} + \gamma_4 Inter_{s,t} \varepsilon_{t,s}$ Intra5 = 1 for five years after states relaxed intrastate branching restrictions, 0 otherwise

Inter5 = 1 for five years after states relaxed interstate branching restrictions, 0 otherwise Inter5 = 1 for five years after states relaxed interstate branching restrictions, 0 otherwise

Only the coefficient on Inter5 counteracts the impact of the branching reforms on

quality of banking. However, even this is not statistically signific**n**t. This s uggests that the reforms did have a long term impact on growth. Since not much time has elapsed from the time when the deregulatory phase ended, especially for those states that deregulated in the 1990s, this conclusion must be made with caution. Thus, in order to verify that the reforms had a long term effect, a sub-sample of only those states that had relaxed both forms of deregulation by 1990 was studied. Table 3b(v) presents the relevant statistics from the regression on this sub-sample.

	Coefficients				
	Unstand	lardized	Standardized	t-statistic	Sig.
Independent Variable	В	Std. Error	Beta		
INTER	005	.001	299	-7.222	.000*
INTRA	002	.001	099	-1.718	.086
Coefficients after introducing Intra5 and Inter5					
INTER	004	.001	272	-6.205	.000*
INTRA	001	.001	096	-1.664	.096
Intra5	002	.001	098	-2.103	.036*
Inter5	001	.001	039	841	.400
Dependent Variable: LLperTL					
<b>Model</b> : $\alpha_t + \beta_s + \gamma_1 INTRA_{s,t} + \gamma_2 INTER_{s,t} + \gamma_3 Intra5_{s,t} + \gamma_4 Inter_{s,t} \epsilon_{t,s}$					

**TABLE 3b(v)**: States that relaxed both forms of branching by 1990.

The Intra5 dummy is in fact quite significant and promotes improvements in the banking quality. Thus, at least for this sub-sample, the effects of deregulation persist after 5 years as well. The larger coefficients (-.005 for INTER and -.002 for INTRA in this sample compared to -.004 and -.001 respectively for the 50 regions considered earlier) also confirm the claim that the earlier deregulators gained more from the reforms.

Thus, there is strong evidence that bank branching reforms made a significant impact on economic growth by improving the quality of banking. Moreover, this effect did not seem to diminish, even five years after the implementation of these reforms.

#### Growth through Changes in the Quantity of Banking

The first part of the study showed that bank branching reforms had a significant impact on the real economic growth by improving the quality of banking. The next part of the study is to establish whether any gains came through improvement in the quantity of banking. Table 4a below presents the estimates of coefficients on the variables of interest.

		Coefficients			Sig
	Uns	tandardized	Standardized	- t-statistic	Sig.
Independent Variables	В	Std. Error	Beta		
a	.089	.008		10.633	.000*
INTRA	.001	.004	.005	.187	.852
INTER	.003	.005	.020	.593	.553
R-square .728					
<b>Dependent Variable</b> : Commercial and Industrial loans divided by State Personal Income <b>Model</b> : $Q_{s,t} = a + \alpha_t + \beta_s + \gamma_1 INTRA_{s,t} + \gamma_2 INTER_{s,t} + \varepsilon_{t,s}$					

TABLE 4	<u>a: Quantity</u>	y of Ban	<u>king</u>

The coefficients on INTRA and INTER are positive, which is in accordance with Shaw's theory that deregulation will increase financial deepening. Here, we see that the bank branching deregulations increased the amount of loans issued by the commercial banks. However, the coefficients are quite insignificant. As they stand, they are not even significant at the 50% level. Hence, there is not enough evidence to reject the null hypothesis that there is no relationship between the regulatory changes and the quantity of banking. Thus, even though we see a positive estimate, we cannot reach any significant conclusion from this part of the analysis. In any case, the predicted and residual values were used in the second part of this analysis. The relevant statistics are shown in table 4b(ii) below.

	Coefficients				
	Unstandardized		Standardized	t-statistic	Sig.
Independent Variables	В	Std. Error	Beta		
a	.003	.008		.429	.668
Q_pred	.124	.061	.237	2.027	.043*
Q_res	.008	.024	.009	.356	.722
GDPgrowth	.233	.031	.199	7.402	.000*
R-square 0.057					
<b>Dependent Variable</b> : Per capita personal income growth <b>Model</b> : Growth <sub>s,t</sub> = $a + \beta_s + \gamma O$ pred <sub>s,t</sub> + $\lambda O$ res <sub>s,t</sub> + $\delta GDP$ growth <sub>t-1</sub> + $\epsilon_{s,t}$					

TABLE 4b(ii): Per Capita Personal Income Growth and Quantity of Banking

The coefficient on Q\_pred is positive which shows that an increase in quantity of banking as predicted by the first part of the analysis does have a positive impact on state economic growth. However, this cannot be claimed with authority because the estimates from the first stage themselves were not significant. In order to check whether banking quantity is correlated with growth at a significant level, another regression was run using the *actual* values of commercial and industrial loans. The estimate was again positive but was not significant (estimate = .023; t-statistic = 1.060).

This analysis shows no strong evidence to support the theory that interstate and intrastate bank branching deregulations made an impact on real economic growth by increasing the quantity of banking. In yet another attempt to analyze the relationship between the regulatory reforms and quantity of banking, a different proxy –assets held by commercial banks as a percentage of the state personal income – was used. The coefficient estimates on the reform dummies when using this proxy were in fact negative but were also insignificant [INTER = -.025 (t-statistic = -1.650); INTER = -.029 (t-statistic = -1.462)]. The impact of the reforms on the quantity of banking is quite ambiguous. However, these results support argument that states did not regulate in anticipation of a growing economy or a growing need for banking.<sup>23</sup> Thus, to some degree, these findings justify the assumption used in this model about no endogenous relationship between economic growth and bank branching deregulation.

Bank branching reforms did have a positive and significant impact on the real economy primarily via improvements in banking quality. This study showed that growth increased on average by about .46 percentage points among those states that deregulated prior to 1990 and by about .13 percentage points among those that deregulated after 1990. There is also strong evidence that this growth push was not temporary (the growth effect lasted at least five years). JS estimated the annual growth rate to increase by .51 to 1.19 percentage points, depending on the proxy used, following intrastate branching deregulation for the entire sample period, 1972 - 1992. This study showed that states that deregulated in the 1990s enjoyed only about one-third of the growth push experienced by

<sup>&</sup>lt;sup>23</sup> However, this does not prove that none of the states deregulated for this reason.

other states. Since the JS study ends at 1992 and misses to capture this part of the result, their estimates may have an upward bias.

Commercial banks hold a significant proportion of the resources in the economy. On average, assets held by these banks as a proportion of total state personal income was about 63.6% and this figure ranged from 4.14% (CT 1997) to 297 % (RI 1997). Since the banking sector was already so large in relation to the size of theeconomy, increasing the assets held by the banking system is probably not feasible. This is a possible explanation for why the banking reforms were not able impact the size of the banking sector at a significant level. Given the size of the banking sector, it is not surprising that a significant improvement in its efficiency will contribute to the economy in the degree suggested by this study.

#### VII. Critique of the Model

The first parts of the models were used to investigate the impact of the reforms on two different characteristics of the banking sector. These helped identify the changes in the characteristics brought about by the reforms. The predicted values from this part were then used to study the impact of the reforms on the real economy. Since the values used in the second part were defined by the bank branching reforms, the relationships between growth and the predicted values of these variables are not endogenous. The models also included state and year dummies to control for unobserved variations. However, this is not to say that the regressions are completely free of omitted variable problems.

Another issue that came about during this study was the comparison between the short term and the long term effects of these reforms on economic growth. Given the

sample, it is not statistically reasonable to include another dummy variable that indicated more than five years of the branching reform. Since a lot of the states deregulated after 1990 and the sample goes only until 1997, there was a constraint on studying the long run impact of these reforms. However, increasing the sample period was not a feasible task either. Had we done so, oher reforms such as the Gramm -Leach Bliley Act that took into effect by the late 1990s would have complicated the study.

The Savings and Loans crisis in the 1980s was a huge blow to the savings and loans institutions in particular, and to the entire U.S. economy in general. The commercial banks were not the primary players in this crisis, but they probably felt a significant impact because of this. Extracting information from the first part of the models, and using them in the second part helped us avoid issues like this but the analysis would probably have yielded more robust results if such situations were explicitly controlled for.

The lagged US GDP growth rate was used to control for the broader business cycle. However, it probably would have been better to use local business cycles that states were more closely tied to. Again, the two-part methodology was used just to concentrate on the impact of the reforms through a particular channel; including such control variables would have made the estimates more robust.

Using data at the state level helped this study ignore several institutional differences that would have been a major concern had country data been used. Even then there were several econometric issues that could not be resolved because of the nature of the panel data used in this study. The implications of the results of this study would be more concrete if these econometric issues can be addressed. Or, perhaps the use of

statistical tools other than the Ordinary Least Squares (OLS) method would be more suitable to study the panel data.

#### VIII. Conclusion and Suggestions for Further Research

This study shows that intrastate and interstate bank branching deregulation induced real economic growth mostly via improvement in banking quality. The improvements in banking quality due to the reforms helped states grow by an extra .46 percentage points before 1990 and by about .13 percentage points after 1990. This growth push accelerated state personal income by about 15% prior to 1990 and by about 5% after 1990. Furthermore, the results also suggest that the growth push was not just a temporary one, at least in the time dimension considered in this study. The results, however, could not reject the hypothesis that the banking reforms did not make a significant impact on banking quantity. The two variables used to proxy banking quantity in this study yielded contradicting results. However, in both cases the estimates were insignificant.

These banking reforms, by lifting the constraints that had previously prevented better-run banks from gaining ground over their less efficient rivals, were able to make a positive and significant impact on the real economy. The local monopolies created by the banking restrictions had given rise to inefficiency in the banking sector. These reforms eliminated the local monopolies, encouraged competition, and improved efficiency in the banking sector. Banks were then able to pass part of the benefits to the customers through cheaper and better services. As a result, the real economy benefited.

These findings do support the Schumpeter hypothesis that financial development matters for economic growth. This study tackled the causal relationship between

economic growth and developments in the banking sector by looking at the values as defined by the regulatory reforms. However, Shaw's hypothesis that relaxation of government restrictions will improve real economic growth via increased financial deepening could not be validated. Since the size of the banking sector in the sample considered in this study was already very large compared to the size of the economy, the reforms may not have been able to make a significant impact. This study, however, does not refute that such reforms may promote financial deepening in economies with a smaller banking sector. Further studies can be conducted to test this hypothesis by analyzing samples with wider variations.

In this study, only two channels through which the reforms can impact economic growth were considered. Further research can look at other channels to focus on how exactly the economies felt the growth push. Areas of interest may be: changes in the smaller versus larger businesses; consolidation in the banking sector; and changes in the number of people that were involved with commercial banks – for personal use as well as for investments.

This analysis looked at only the benefits of bank branching reforms. As mentioned earlier in the paper, this period was plagued by a lot of bank failures. An interesting project with potentially very important policy implications would be to study if these reforms had any role in these bank failures.

## Appendix:

## **Bibliography:**

Abrams, Burton A.; Clarke Margaret Z. and Settle Russell F. "The Impact of Banking and Fiscal Policies on State-Level Economic Growth." *Southern Economic Journal*, October 1999, 66(2), pp. 367-378.

Arestis, Philip and Demetriades, Panicos. "Finance and Growth: Is Schumpeter 'Right'?" Department of Economics, Keele University, *at* http://www.ufrgs.br/fce/rae/edicoes\_anteriores/pdf\_setembro98/arestis.pdf.

**Cameron, Rondo R.** *Banking and Economic Development*. New York, NY. Oxford University Press, 1972.

**Clarke, Margaret Ziurys.** "Geographic Deregulation of Banking and Economic Growth." Unpublished, Pennsylvania State University, *at* http://economics.sbs.ohio-state.edu/jmcb/j90048/99048.pdf.

**Freeman, Donald G.** "Did State Bank Branching Deregulation Produce Large Growth Effects?" *Economics Letters*, 2000, 75, pp. 383-389.

Fomby, Thomas B; Hill, Carter and Johnson, Stanley R. Advanced Econometric *Methods*. New York, NY: Springer-Verlag, 1984.

**Gujarati, Damodar N.** *Basis Econometrics*. 4<sup>th</sup> edition. New York, NY: McGraw-Hill/Irwin, 2002.

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

\_\_\_\_\_. "Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking." *Journal of Law and Economics* April 1998, XLI, pp. 239-273.

**King, Robert G. and Levine, Ross.** "Finance and Growth: Schumpeter Might Be Right." *The Quarterly Journal of Economics*, August 1993, 108(3), pp. 717-737.

Levine, Ross. "Financial Development and Economic Growth." *Journal of Economic Literature*, June 1997, 35(2), pp. 688-726.

\_\_\_\_\_. "More on Finance and Growth: More Finance, More Growth?" The Federal Reserve Bank of St. Louis Working Paper, July/August 2003.

**Levine, Ross; Loayza, Norman and Beck, Thorsten.** "Financial Intermediation and Growth: Causality and Causes." *Journal of Monetary Economics*, August 2000, 46(1), pp. 31-77.

**Peristiani, Stavros.** "Do Mergers Improve the X-Efficiency and Scale Efficiency of U.S. Banks? Evidence from the 1980s." *Journal of Money, Credit and Banking*, August 1997, 29(3), pp. 326-337.

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

Robinson, Joan. The Rate of Interest and Other Essays. London: Macmillan, 1952.

**Schumpeter, Joseph A.** *The Theory of Economic Development*. Cambridge, MA: Harvard University Press, 1959.

**Shaw, Edward S.** *Financial Deepening in Economic Development*. New York: Oxford University Press, 1973.

**Stiroh, Kevin J. and Strahan, Philip E.** "Competitive Dynamics of Deregulation: Evidence from US Banking." *Journal of Money, Credit, and Banking*, October 2003, 35(5), pp. 801-828.

**Strahan, Philip E.** "The Real Effects of U.S. Banking Deregulation." The Wharton Financial Institutions Center Working Paper, September 2002.

Year of I	nterstate and	Intrastate	Branching	Deregulation

State	Intrastate	Interstate
Alabama	1990	1987
Alaska	<1970	1982
Arizona	<1970	1986
Arkansas	**	1989
California	<1970	1987
Colorado	**	1988
Connecticut	1988	1983
Delaware	<1970	1988
DC	<1970	1985
Florida	1988	1985
Georgia	**	1985
Hawaii	1986	**
Idaho	<1970	1985
Illinois	1993	1986
Indiana	1991	1986
Iowa	**	1991
Kansas	1990	1992
Kentucky	**	1984
Louisiana	1988	1987
Maine	1975	1978
Maryland	<1970	1985
Massachusetts	1984	1983
Michigan	1988	1986
Minnesota	**	1986
Mississippi	1989	1988
Missouri	1990	1986
Montana	**	1993
Nebraska	**	1990
Nevada	<1970	1985
New Hampshire	1987	1987
New Jersey	**	1986
New Mexico	1991	1989
New York	1976	1982
North Carolina	<1970	1985
North Dakota	**	1991
Ohio	1989	1985
Oklahoma	**	1987
Oregon	1985	1986
Pennsylvania	1990	1986
Rhode Island	<1970	1984
South Carolina	<1970	1986
South Dakota	<1970	1988
Tennessee	1990	1985
Texas	1988	1987
Utah	1981	1984
Vermont	1970	1988
Virginia	1987	1985
Washington	1985	1987
West Virginia	1987	1988
Wisconsin	1990	1987
Wyoming	**	1987

\*\*States not fully deregulated by 1996 Source: "The Real Effects of U.S. Banking Deregulation," Strahan (1999)

Statistical Summary for the Variables Used				
	Mean	Standard Deviation	Minimum	Maximum
Per capita personal income growth (entire sample period)	.0162	.0308	1576	.3279
Per capita personal income growth (1970 – 1990)	.0193	.0340	1576	.3279
Per capita personal income growth (1991 – 1997)	.0086	.0188	0495	.0848
State personal income growth (entire period)	.0282	.0347	1547	.3310
State personal income growth (1970 – 1990)	.0299	.0378	1547	.3310
State personal income growth (1991 – 1997)	.0230	.0218	0412	.0890
Net Charge-offs per total commercial bank loans	.0062	.0065	0027	.0839
Total assets held by commercial banks per total state personal income	.6359	.2831	.0414	2.9745
Commercial and Industrial Loans issued by Commercial banks per total state personal income	.1023	.0682	.0044	.7402
GDP growth	.0236	.0263	0413	.0661

## **Data Sources**

Annual State SPI (Economic Growth)	<ul> <li>Bureau of Economic Analysis</li> <li>http://www.bea.doc.gov/bea/regional</li> </ul>
Per Capita Personal Income	<ul> <li>Bureau of Economic Analysis</li> <li>http://www.bea.doc.gov/bea/regional</li> </ul>
Commercial and Industrial Loans (Quantity of Banking)	<ul> <li><i>FDIC: Statistics on Banking</i></li> <li>http://www2.fdic.gov/hsob</li> </ul>
Total Commercial Bank Assets	<ul> <li><i>FDIC: Statistics on Banking</i></li> <li>http://www2.fdic.gov/hsob</li> </ul>
Net Charge-offs (Quality of banking)	<ul> <li><i>FDIC: Statistics on Banking</i></li> <li>http://www2.fdic.gov/hsob</li> </ul>
Total Commercial Bank Loans	<ul> <li><i>FDIC: Statistics on Banking</i></li> <li>http://www2.fdic.gov/hsob</li> </ul>
Inflation calculator	<ul> <li>Bureau of labor statistics</li> <li>http://www.bls.gov/cpi</li> </ul>
U.S. GDP	<ul> <li>Bureau of Economic Analysis</li> <li>http://www.bea.doc.gov/bea</li> </ul>